

# “To Have and Have Not”: International Migration, Poverty, and Inequality in Algeria\*

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## Abstract

In this paper, using an original survey, we analyze the distributional impact of international migration across two regions of Algeria. A semi-parametric descriptive analysis is complemented with a parametric model. Remittances do not significantly change the Gini coefficient in nearly any of the counterfactual scenarios. However, migration reduced poverty by 40 percent, with different effects across regions for extreme poverty. Foreign transfers, especially foreign pensions, have a strong positive impact on very poor families in one region. Poor families in the other region suffer from a “double loss”: their migrants do not provide local income and they do not send much money home.

*Keywords:* Inequality; migration; pensions; poverty; remittances

*JEL classification:* F24; O15; O55

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\*The authors are grateful to two anonymous referees for their comments and suggestions that led to significant improvements in this paper. We also thank the participants of the Journées de Microéconomie Appliquée (Clermont-Ferrand, France, June 2014) and the World Bank, AFD, University of Lille conference “Migration and Development” (Ifrane, Morocco, May 2013), and Denis Cogneau for their comments. This article is financed in part by FEMISE Agreement No. FEM33-2.

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## **I. Introduction**

Migration is one important means by which people from poor countries seek to improve their living conditions and those of their families. Many of them send some of the money they earn in the host country back to their families in their home country. These remittances are quantitatively enormous: in 2013, remittances to developing countries amounted to 414 billion dollars (World Bank, 2013). Unlike development assistance, remittances are a type of external income that is directly paid to households, and thereby can have a large impact on welfare for recipient families in countries still mired in poverty.

The scale of the sums involved has driven a revival in the literature on the impact of transfers on migrant-sending countries. Among the many issues debated is the impact of transfers on poverty and the distribution of income. Although the literature has come to a consensus that remittances can lead to a reduction in poverty, there is less agreement about the effects on inequality.

Given the variability of results, it can be helpful to re-situate the effects of remittances in the context and history of the migration flows that underlie them. Over time, migration flows lead to the constitution of increasingly dense networks in receiving countries and better information in the sending countries, which reduces the cost of future migration and can help reduce inequality by allowing the poorest households to send migrants abroad or to other towns. This generates an inverse U-shaped relation between emigration and inequality, as shown both theoretically and empirically by McKenzie and Rapoport (2007).

In this paper, we consider the effects of emigration on poverty and inequality by drawing on an original survey conducted in Algeria.<sup>1</sup> It is the first household survey in Algeria that specifically addresses the issues of migration and remittances,<sup>2</sup> and provides the information necessary to evaluate their impacts on poverty and inequality. Furthermore, unlike many household surveys, this survey also collects information on pensions (a very important income source) received in the country of origin, based on overseas work for returning migrants. It focuses on two regions (Kabylia and Tlemcen), which differ in terms of diaspora organization, migration history, and regional insertion.

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<sup>1</sup> The survey was conducted in the spring of 2011, interviewing 1,200 households living in two communes. This survey was carried out in collaboration with the Centre de Recherches en Economie Appliquée et Développement (CREAD). The authors wish to thank Nacer-Eddine Hammouda for his role in the successful administration of the survey.

<sup>2</sup> The survey also collected data on in-kind transfers, but these data were not used because of valuation issues. As such, in this paper we only consider monetary transfers, although a preliminary analysis of (likely unreliable) in-kind transfer data suggests that these amounts, when they exist, are often quantitatively large.

Use of household-level data and black market exchange rates, instead of official accounts, is critical to assessing accurately the impact of foreign transfers on poverty and inequality.<sup>3</sup> According to some estimates (Charmes, 2010), informal remittances received in Algeria are two to three times higher than official remittances received, while conversion of remittances at the black market exchange rate increases their purchasing power by up to 50 percent.

To estimate the impact of remittances on poverty and inequality, we perform a semi-parametric descriptive analysis and we also estimate a parametric model, which allows for the simulation of counterfactual household income and the calculation of the impact of migration on the distribution of income across households. Several scenarios are examined, in order to characterize a wide range of potential situations for the counterfactual setting without migration. The analysis decomposes the effects of international transfers into the parts due to remittances and due to the pensions of retired migrants. A comparison of the results for the two regions is also carried out, taking into account their historical features and their differences in terms of diaspora organization.

In Section II, we provide a brief summary of the migration histories of the two Algerian regions studied here. In Section III, we summarize the body of literature that deals with the effects of remittances on poverty and inequality, in particular that based on household survey data. In Section IV, we describe the methodology used to generate household income in the various counterfactual scenarios. In Section V, we present the data and descriptive characteristics of households using the DiNardo–Fortin–Lemieux (DFL) semi-parametric methodology (DiNardo *et al.*, 1996). In Section VI, we provide the results of the impact of emigration on poverty and inequality, using the counterfactual model based on individual-level Heckman (1979) selection-corrected estimates. We conclude in Section VII.

The main findings are that remittances, including foreign pensions, do not significantly change the Gini coefficient in either region. However, the simulations suggest that migration has reduced poverty by nearly 16 percentage points (40 percent), with the effect in Kabylia (Idjeur) being twice as large as in Tlemcen (Nedroma) with regards to extreme poverty. Foreign transfers, especially foreign pensions, have a strong positive impact on very poor families in Idjeur but much less so in Nedroma, where poor families suffer from a “double loss” because their migrants do not provide local income and do not send much money home. This difference

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<sup>3</sup> For example, officially recorded remittances received by Algeria (World Bank annual remittances database) are much lower than in other countries in the region: in 2010, they represented only 1 percent of GDP (two billion dollars). This compares to an average for the Middle East and North Africa (MENA) region of 3.1 percent of GDP.

between the two regions might be explained by the fact that communities in Kabylia are more structured, and that Kabyle emigrant communities overseas replicate these structures, reinforcing strong social norms in favor of remitting behavior. Finally, we present results consistent with the finding in the literature showing an inverse U-shaped relationship between past migration and inequality, but suggesting a nuanced interpretation due to the inequality-inducing effects of foreign pensions.

## II. Algerian Migration: A Primer

Algerian emigration is largely concentrated in the former colonial country. In 2010, Algeria had some 1.211 million emigrants<sup>4</sup> (excluding illegals), representing 3.4 percent of its population, and 96 percent were identified as living in France. The long history of migration between Algeria and France has led to the emergence of large and diversified diaspora.

The communes studied here are Idjeur, in the North-Eastern Kabylia region, and Nedroma, in the North-Western Tlemcen region. They both have high expatriation rates and are similar in terms of the lengths of their migration histories. Nevertheless, these regions differ in the organization of their diaspora. In particular, emigration from Kabylia to France began at the end of the nineteenth century, and the overseas communities of Kabyle migrants strongly replicate the organization of the villages in the home region, with strict social norms for their members.<sup>5</sup>

In order to understand the differences and importance of migration for these regions, a brief historical retrospective can be useful. French colonization met strong resistance in the Algerian countryside, and especially in the mountainous areas of Kabylia. Between 1830 and 1872, the French colonists waged a continuous war against the natives (Stora, 2004; Bouchène *et al.*, 2012). Repression was fierce and insurgents were deported. The colonial power adopted a “scorched earth” policy by dismantling the early industrial structure (ceramics, watches, etc.) that abounded in Kabylia. This contributed to a drop in the native Algerian population from three million to about a little over two million, and to the impoverishment of the region, leading to significant internal migration as well as international migration to France. Since this time, Kabylia’s economy has been heavily dependent on remittances from migrants, especially from France.

During the period of French colonization, the region of Tlemcen (along with Kabylia, the Dahra, and Aures) was also a major source of Algerian emigration. However, international migration accelerated more

<sup>4</sup> Source: Office National des Statistiques (ONS), Algeria.

<sup>5</sup> See Miotti *et al.* (2010) or Sayad (1999) from the sociology literature.

recently than for Kabylia, picking up after World War I, and especially after World War II, driven by labor demand from France. Emigration from Tlemcen decreased significantly after independence in 1962, however, whereas it continued substantially for Kabylia. The region of Tlemcen is more integrated to the domestic Algerian economy, and is much more connected to the networks of political power of the Algerian state, whereas Kabylia has remained isolated and its (limited) development is fueled by its diaspora.

The rise in unemployment in France in 1974 pushed the French government to close its borders, which considerably increased the costs of migration and changed its nature. More recent waves of migration have striven to cut some costs, such as those associated with installation and information, allowing poorer classes of the population to emigrate.

Many older Algerian emigrants spent all their working lives in France, receiving their (French) pensions on returning to Algeria. These pensions can represent a huge part of household income for migrant-sending households in countries such as Algeria, which have a long history of migration. Such pensions are clearly much more important in countries participating in the oldest waves of migration, such as countries with colonial ties to their ex-colonizing countries.

### **III. A Review of the Literature on the Impact of Remittances**

While studies looking at the impact of remittances on poverty are unanimous in indicating a reduction in poverty, the literature on inequality is less clear, especially as a function of the income level of the home country.

Studies generally show a significant poverty-reducing impact of transfers in home countries, whatever method is used. Adams and Page (2005) have shown that for low-income countries, a rise of 10 percent in the migrant population leads to a fall of 1.9 percent in the share of people living on less than \$1 per day. This result has also been found in sub-Saharan Africa (Gupta *et al.*, 2009), and in Central and South America (Acosta *et al.*, 2008). Using a counterfactual-based methodology, Adams (1989) estimated that transfers reduce poverty in Egypt by 2.4 percent. This was also the case for Fiji Islands and Tonga (Brown and Jimenez, 2008). The results were even clearer for Mali (11 percent; Gubert *et al.*, 2010) and Burkina Faso (17–39 percent; Lachaud, 1999).

While some researchers simply use universal poverty thresholds, such as \$1 or \$2 per day, which facilitate international comparisons, others measure poverty in terms of gravity, intensity, and incidents. Adams and Page (2005) use a sample of 71 countries and find that a rise in the number of migrants leads to a fall in poverty, for all three indicators used. Adams (1989) also uses these three measures of poverty in a study of Ghana, where he concludes that remittances reduce the number of poor

people, although the impact varies according to the indicator used. In their study of Nigeria, Chiwuzulum Odozi *et al.* (2010) look at relative poverty thresholds in addition to these three indicators,<sup>6</sup> once again finding the same result. Lastly, Esquivel and Huerta-Pineda (2007) defined poverty using three indicators: food consumption, capacities (health and education), and assets owned. They found that, in Mexico, transfers lowered poverty according to the first two measures, but not the third.

The results are less unanimous concerning the impact on inequality. Stark *et al.* (1986a) compared Gini coefficients for Mexican households, and found that remittances did equalize the distribution of income, especially for people with networks in the US. Using a counterfactual income scenario, Adams (1989) found that remittances increased income inequality in rural Egypt, because migrants tend to come from families belonging to higher classes, and these migrants have a tendency to transfer more money than migrants from the lowest quintile.

The impact of migration on inequality has also been found to depend on the characteristics of individuals, and especially on the wealth of the countries studied. For example, Barham and Boucher (1998) have estimated that transfers to Nicaragua reduce inequality. Acosta *et al.* (2008) have also found that there is a reduction in inequality in Nicaragua (in their imputed non-remittance income specification), but they generally find small effects in the ten Central and Latin American countries they study. Gubert *et al.* (2010) calculated that remittances either led to a statistically insignificant reduction in the Gini efficient of the order of 5 percent in Mali, or had no quantitative impact at all.

Allowing for a non-linear relation between inequality and the length of the migration history helps to explain these results. Ebeke and Le Goff (2010) show an inverse U-shaped relationship between emigration and inequality for a panel of 80 developing countries, following the results found by McKenzie and Rapoport (2007) for Mexico. Using a Gini index decomposition method, Taylor and Mora (2006) also found that inequality rises in Mexican rural areas when migration begins and networks are limited, but falls as migration intensifies. The mechanism linking emigration history and inequality is straightforward. At the first stage of emigration, only rich families can afford to send migrants abroad because of the high migration costs, resulting in an increase in inequality. In the second stage, inequality decreases because the presence of a larger diaspora reduces migration costs for the poorer households, who can then afford to send migrants and can receive money as a result.

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<sup>6</sup> The relative poverty threshold is not commonly used when studying developing countries because absolute thresholds are often preferred.

#### IV. Empirical Method

It is expected that poverty and income inequality depend in large part on the characteristics of the household and their distribution. In order to analyze their effects, first we employ the semi-parametric decomposition technique developed by DiNardo *et al.* (1996) to characterize the differences between households with and without migrants, and between households that receive remittances and those that do not. Next, we estimate a set of parametric models in order to be able to simulate various counterfactual (migration-free) situations, and to simulate the impact of migration on poverty and the distribution of household incomes.

##### *Distribution of Characteristics across Households: Semi-Parametric Approach*

Intuitively, the DFL semi-parametric distribution comparison technique is based on reweighting the distribution of characteristics of treated (with migrant) households so that they resemble the distribution of control (non-migrant) households, and then comparing the resulting “counterfactual” distribution with the original distribution. More precisely, instead of comparing the unconditional income densities estimated by standard kernel density estimation techniques, each observation in the treated sample (households with migrants) is weighted by the ratio of the estimate of the density of the observed value for the treated population to the estimate of the density of the observed value for the control population. For example, if a probit model is used to estimate the probability of having a migrant [ $P(\widehat{Mig}|X) = \Phi(X\hat{\beta})$ ], then the weight used in the kernel estimates is calculated as

$$\frac{P(\widehat{NoMig}|X)}{P(\widehat{Mig}|X)} \frac{P(Mig)}{P(NoMig)} = \frac{1 - \Phi(X\hat{\beta})}{\Phi(X\hat{\beta})} \frac{PctMig}{PctNoMig},$$

where  $PctMig$  is the share of households with a migrant in the population, and  $PctNoMig$  is the share of households without a migrant.

##### *Impact of Migration on Poverty and Inequality: Parametric Counterfactual Analysis*

*Background.* The earliest studies on the impact of remittances on the income of families living in the country of origin overlooked two important phenomena. First, migrants no longer contribute domestic-source income to their households after leaving. Not taking these opportunities into account can lead to a significant overestimation of the impact of remittances on household income. Second, the individuals who migrate are not

randomly chosen among household members. The transposing of coefficients obtained for non-migrant households onto households with migrants, as was done by Adams (1989), is only valid when the characteristics of the two types of households are identical (conditional on observable variables), which is equivalent to a situation with random selection of migrants within the population.

Explicitly modeling selection into migration using the technique of Heckman (1979) can eliminate the bias in parameter estimates needed to reconstruct domestic income for migrants in counterfactual scenarios. This modeling approach has already been used for surveys in Latin America and sub-Saharan Africa (Acosta *et al.*, 2008; Gubert *et al.*, 2010). We adopt a strategy similar to Barham and Boucher (1998), not only modeling selection based on migrant/non-migrant status, but also accounting for selection into employment among individuals remaining in the country of origin.

*Methodology.* We consider income from local sources separately for the working-age population and for the elderly, and we estimate all models at the individual level.<sup>7</sup> For the working-age population, a pair of selection-corrected earnings equations is estimated, one for self-employment income and another for wage earnings. For the elderly, a selection-corrected model of local (non-Mujahidin) pensions is estimated. Below, we describe the specifications for each individual-level model (the results of which are presented in Appendix C) and the construction of the counterfactual household incomes based on these model results.

**Self-employment income.** The self-employment income model estimates log self-employment income as a function of a set of individual and household-level covariates, correcting for selection bias using Heckman's technique and providing for exclusion restrictions in the selection equation. Self-employment income is assumed to be a function of individual and household-level variables. The individual variables are: sex, age, age squared, and education (five categories – no education is the reference category). The household variables are: region (Idjeur or Nedroma), number of local household members under 15, number aged 15–65, number aged over 65, an index of physical assets for the household, whether there was a civil servant among family members, the presence of a Mujahidin pension, and the local unemployment rate.

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<sup>7</sup> The dataset collects information at the household level but provides for enough individual-level breakdowns of variables (up to ten individuals per household) to make individual-level estimation possible. See the first subsection of Section V and Appendices A and B for more details.

Most of these variables are standard for Mincer-type earnings equations, but several merit additional explanation. The indicator for having a civil servant family member proxies for access to a specific clientele, and the local unemployment rate proxies for product demand conditions. The family composition variables capture available productive resources that do not necessarily need to be remunerated. The asset index<sup>8</sup> captures two factors that can affect self-employment income: capital available for production and collateral against which the individual can borrow to finance investment for the enterprise. The presence of a Mujahidin pension in the household provides additional resources that can be mobilized for investment in the enterprise.<sup>9</sup>

The selection equation is based on two criteria: (i) the individual did not emigrate; (ii) the individual was self-employed. The selection equation includes all of the variables from the main self-employment income equation, as well as the following exclusion restrictions: the sex of the household head, the presence of agricultural income for the household, an indicator for whether the household owned land, the number of males in the household (including migrants), and the share of individuals based in the locality who have migrated.

Three of the exclusion restrictions relate to the migration decision. First, female-headed households are often those in which the male spouse has emigrated, implying a lower probability of non-migration for these households. Second, households with more males have a higher probability of sending at least one member to work overseas.<sup>10</sup> Third, a larger share

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<sup>8</sup> A multiple correspondence analysis (MCA) was conducted to calculate the asset index. The index was constructed based on the presence/absence of the following goods: transport equipment; industrial machines; commercial premises; motor bicycles; industrial premises; computers; residential property (other than family home); agricultural land; sewing machines; private cars; agricultural machines. The first axis (F1) summarizes nearly 65 percent of the information contained in the variables used, and brings together productive assets linked to activities and occupations that are more urban (distribution, services, small industry/crafts/trades), whereas the F2 axis relates to agricultural activities (agricultural machinery and land) and computers.

<sup>9</sup> Mujahidin pensions are a rent received by certain families who have had a "Mujahed" (i.e., a martyr or a combatant of the independence war of 1954–1962). When the Mujahed dies, the spouse and the children receive this rent for the rest of their lives.

<sup>10</sup> As sociological analysis of Algerian migration to France showed long ago (Sayad, 1977), there is often a division of labor between those who will stay to work the land or occupy a job in government, for example, and those who will migrate specifically to send home remittances when a family has a lot of boys. Following Mansuri (2008) for Pakistan, this suggests that the more boys a household has, the greater will be the probability of sending migrants abroad.

of individuals in the locality that have migrated leads to richer overseas networks of contacts,<sup>11</sup> which reduces migration costs.<sup>12</sup>

The last two exclusion restrictions reflect the ease of access to self-employment and (potentially) difficulty of access to wage employment. When a family owns land, it is easier for any given household member to work as a (self-employed) farmer. Likewise, when there is agricultural income coming in to the household, this means that there is already at least one household member who is a farmer, which can reduce the cost of any other member becoming a farmer. Moreover, land and agricultural revenue are factors that are more common in rural areas, where wage employment is less prevalent and therefore self-employment might be the best remaining alternative.

**Wage earnings.** As with the self-employment income model, the wage earnings model estimates log wage earnings as a function of a set of individual and household-level covariates. Wage earnings are assumed to be a function of the same individual-level control variables as the self-employment income model. However, only three of the household-level variables are included in the wage earnings model: region, the asset index (which serves as a proxy for household wealth), and the indicator for having a civil servant family member (which proxies for ease of access to a specific set of high wage jobs). The remaining variables from the self-employment income equation are exclusion restrictions in the selection equation, because these affect the value (and thus the choice) of self-employment relative to wage employment.

One particular variable deserves additional attention, because its role in selection is twofold. The presence of a Mujahidin pension employs a household member with the status of “child of Mujahidin”. This comes with numerous advantages in Algeria, in particular priority access to public sector employment and the right to keep a job when employers downsize. This status does not, however, directly affect the level of wage earnings because public sector wages are strictly determined by the public sector salary schedule.

**Local pension income.** Because elderly individuals are observed after their careers are finished and there is no information on their previous work experience, the estimation of the local pension income model is based on

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<sup>11</sup> See Lachaud (1999) and Adams (2006) for the use of such an instrument to explain migration in Africa.

<sup>12</sup> In Idjeur, for example, the villages are organized around the Marabou village of Tifrit Ath Oumalik. Marabou villages are formed by koranic teachers (sheiks) whose objective is to spread the Koran through Kabylia, Algeria, or overseas. They encourage mobility, which helps build migrant networks.

a more limited set of variables. Log local pension income is assumed to be a function of sex, region, number of local household members over 65, and whether there was a civil servant among family members. The civil servant variable in this case serves as a proxy for networks that working-age people might have built in part thanks to the experiences of their elders, who might also have been civil servants during their working lives (and thus receiving a “decent” pension). The selection equation is based on whether the person actually receives a local pension, which is only possible if the person worked in Algeria during their working life. The selection equation included all of the variables from the main local pension income equation, as well as the following exclusion restrictions: the sex of the household head, an indicator for whether the household owned land, an index of physical assets for the household, and the presence of a Mujahidin pension.

The exclusions restrictions can be justified as follows. Female-headed households might be households headed by widows, and widows in Algeria receive the pensions of their deceased spouse (if any). Households with more assets or land are households in which there is a greater chance of having a household (self-employment) enterprise. This could have been passed down to the children from the elderly, implying that the corresponding parents were less likely to have earned wages when they worked and are therefore less likely to receive a pension. Finally, as households that receive Mujahidin pensions are also more likely to have access to wage employment, members of these households are more likely to have accumulated pension rights during their working lives.

**Building counterfactuals.** Counterfactuals are built using a five-step process.

- (1) Predicted values are generated for each model. For the wage earnings and self-employment income models, expected level (not log) earnings, conditional on having not migrated and obtained a job of the specified type, are calculated.<sup>13</sup> For local pension income, the expected level of local pension income and the probability of receiving a local pension were calculated. The labor income variables were calculated for all working-age non-migrants, and the pension variables were calculated for all elderly non-migrants.
- (2) The same variables were calculated in the counterfactual scenario without migration. This required increasing the number of local household

<sup>13</sup> The conditioning in this step exploits the hypothesized joint normality of the residuals of the selection and income equations by adding the expected residual (inverse Mills ratio times estimated correlation coefficient times estimated standard error of the income equation) to expected log income, and then exponentiating the sum to obtain the value in levels.

members of each age group by the number of migrant household members of the same age group. The labor income variables were calculated for all working-age household members and the pension variables were calculated for all elderly household members, regardless of migration status.

- (3) Reference expected household income was calculated by summing all transfers received and all predicted labor earnings (for the observed labor market state) and expected local pensions (expected probability of receipt times expected amount) for all local household members.
- (4) Counterfactual household incomes were calculated according to two different approaches for modeling the behavior of non-migrants.

No reallocation approach. In this approach, working-age non-migrants maintain the same employment status (wage employee, self-employed, or not working) in the counterfactual as observed in the data. The results from this approach appear in Appendix D.

Full reallocation approach. In this approach, it is assumed that non-migrants behave in the same way as migrants in the counterfactual, conditional on their observable characteristics. This is the approach that is commented on in the text.

Outcomes for returning migrants (and non-migrants in the full reallocation approach) were calculated according to three scenarios.<sup>14</sup>

Local employment structure. In this scenario, the probability of a returning migrant being a wage employee is assumed to be the same as the observed share of wage employees for individuals of the same sex and education level in the same region, and likewise for the assumed probability of self-employment. The probability of non-employment is assumed to be the same as the observed non-employment rate for the individual's sex-education-region cell. This is referred to as the "average" scenario below.

All wage employees. In this scenario, all returning migrants who work are assumed to find wage jobs. The probability of non-employment is assumed to be the same as the observed non-employment rate for the individual's sex-education-region cell.

All self-employed. In this scenario, all returning migrants who work are assumed to be self-employed. The probability of non-employment

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<sup>14</sup> It is worth noting that none of these approaches or scenarios is likely to perfectly approximate the counterfactual situation, because none of them accounts for general equilibrium effects, changes in labor supply behavior, or changes in the structure of labor demand. Modeling these effects is either impossible with cross-section data (labor supply effects, labor demand effects) or beyond the scope of this paper (general equilibrium effects).

is assumed to be the same as the observed non-employment rate for the individual's sex–education–region cell.

For each approach and under each scenario, the appropriate individual-level outcomes were calculated for all household members (migrants and non-migrants) and aggregated to the household level, without including the value of transfers.

To provide an example, consider a household with three members: (a) a local elderly person; (b) a local wage worker; (c) a migrant. Expected income for person (a), in all approaches and scenarios, can be written as

$$E^{\text{Ref}}(Inc_a) = P(\text{Local Pension} | X_a) E(\text{Local Pension} | X_a, \text{Local Pension} > 0),$$

$$E^{\text{CF}}(Inc_a) = P(\text{Local Pension} | \tilde{X}_a) E(\text{Local Pension} | \tilde{X}_a, \text{Local Pension} > 0).$$

Here,  $X_a$  is the observed set of covariates and  $\tilde{X}_a$  is the set of covariates with the number of local household members altered. For the migrant (c),<sup>15</sup> we have

$$E^{\text{CF,avg}}(Inc_c) = P^{\text{wage}}(\tilde{X}_c) E(\text{wage} | \tilde{X}_c, \text{wage} > 0, \text{nomig}) + P^{\text{self}}(\tilde{X}_c) E(\text{self} | \tilde{X}_c, \text{self} > 0, \text{nomig}),$$

$$E^{\text{CF,wage}}(Inc_c) = [P^{\text{wage}}(\tilde{X}_c) + P^{\text{self}}(\tilde{X}_c)] \times E(\text{wage} | \tilde{X}_c, \text{wage} > 0, \text{nomig}),$$

$$E^{\text{CF,self}}(Inc_c) = [P^{\text{wage}}(\tilde{X}_c) + P^{\text{self}}(\tilde{X}_c)] \times E(\text{self} | \tilde{X}_c, \text{self} > 0, \text{nomig}).$$

Here,  $\text{nomig} = 1$  if the person is a non-migrant,  $P^{\text{wage}}(\tilde{X}_c)$  is the observed share of wage employees in the same sex–education–region cell as person (c), and  $P^{\text{self}}(\tilde{X}_c)$  is the observed share of self-employed in the same sex–education–region cell as person (c). Expected income for non-migrant (b) varies by approach and scenario. For the no reallocation approach, we have simply that the person's expected income is the same as the observed income in all scenarios. For the full reallocation approach, expected income is determined in the same way as for person (c).

<sup>15</sup> Because of the lack of information, many studies have had to make assumptions about certain variables, such as the number of migrants or their level of education (see Gubert *et al.*, 2010). In our case, we know exactly the number of migrants per family, their sex, age, level of education, and commune of origin.

- (5) Total household income in the counterfactual scenarios and approaches was then calculated by taking observed household labor income plus the Mujahidin pension (if one was present), subtracting expected reference household income and adding expected counterfactual household income (i.e., by changing total observed household income by the difference in expected household incomes between the counterfactual and reference settings).

**Confidence intervals.** In order to assign confidence intervals to the poverty and inequality statistics, a non-parametric simulation technique was used.<sup>16</sup> For each model, the expected level individual income, conditional on the selection criterion being met (for the reference setting), was subtracted from the observed level individual income of the corresponding type, and the three sets of residuals were collected. Confidence intervals were then built by drawing 1,000 times for each individual (with replacement) from the relevant distribution of residuals and adding this to the expected level individual income (reference and counterfactual) of the corresponding type. We then aggregated to the household level so that there were 1,000 simulated total household income levels for the reference and counterfactual settings, and we calculated each statistic on each simulation sample. The 95 percent confidence intervals in this case are just the 25th and 975th largest values of the statistic across the set of 1,000 simulations.

## V. Descriptive Analysis of the Data of the Two Surveys Conducted in Algeria

In Appendix A, we discuss the data collection and the construction of ex-post sampling weights for the data analyzed here. We present the basic descriptive statistics in Appendix B. After reweighting, the (equivalent) 6,738 households and 31,840 persons from Nedroma were representative of the population, as were the (equivalent) 1,864 households and 6,914 persons from Idjeur. The fact that Nedroma is much larger than Idjeur

<sup>16</sup> Acosta *et al.* (2008) also used a simulation technique to establish confidence intervals, but they drew from the implied parametric distribution of residuals. Such an approach is not applicable in the context of this paper, because the models are estimated in log form and because draws from the implied (normal) distribution of residuals regularly lead to unrealistic simulated incomes in level form. For example, a draw of three for the wage earnings equation residual would imply that expected wage earnings should be multiplied by  $\exp(3)$  in order to obtain the simulated wage earnings for the draw in question. Such draws are rare individually (i.e., there is a probability of less than 0.00016 for obtaining a draw greater than or equal to 3 for the wage earnings model and less than 0.0017 for the self-employment income model), but occur regularly when one draws 1,000 times for each individual in the sample (0.14 probability of at least one draw over three for each individual in the wage earnings model, and 0.81 probability for the self-employment income model).

implies that weighted overall estimates will tend to resemble those of Nedroma more than those of Idjeur. As previously mentioned, these data are not representative of the whole of Algeria.

### *Descriptive Analysis of the Variables Used in the Model*

Globally, households receiving transfers from migrants (TRANS) are rather old; the number of people over 65 is more than twice the average of the two other types of household. Age is certainly an explanation for the relative lack of education, because migrants are better educated on average, confirming their self-selection. Households with migrants but no transfers (NOTRANS) have similar characteristics to TRANS households. These households have the largest families and they have more males. Lastly, families with no migrants (NOMIG) resemble the families with no transfers from migrants (NOTRANS) although they are younger and smaller, with fewer males.

Differences also appear across households in the two regions. The commune of Idjeur has a higher share of people over 65, which is consistent with the lower average education level that is observed, and is also likely related to its isolated location. Nedroma is more open and is situated in the plain near Tlemcen, and has a slight lead in employment in the public sector. Conversely, the informal sector is very important in Kabylia, and villages there have very high unemployment rates. Finally, households in Kabylia tend to be smaller than those in Tlemcen. The number of boys per household, which is one of our exclusion variables, is 17 percent higher in Nedroma.

Comparing households with and without transfers makes the role of this income source particularly evident. Total household income for households with transfers (TRANS) is nearly two-thirds higher than total household income in households with migrants but no transfers from migrants (NOTRANS). Household income in TRANS households is also higher than in households with no migrants (NOMIG). The differences are largely attributable to transfers from migrants received by domestic members of TRANS households, because local income is actually slightly lower than that of other individuals from NOMIG households. The share of pensions coming from France is a very important part (41 percent) of these foreign transfers.

Finally, a comparison of income sources in Idjeur and Nedroma highlights some important differences. Total transfers from migrants received by households in Idjeur are twice as high as in Nedroma. The differences are due to the nature and distribution of transfers. In Idjeur, there are fewer current migrants who send money (excluding pensions), but the level of transfers is four times higher. Moreover, three times as many

households receive foreign pensions in Idjeur than in Nedroma, and these amounts are far higher than the average transfer. People who have returned to live in Algeria earn retirement income in euros, which they convert using parallel exchange rates, giving their pensions considerable local purchasing power.<sup>17</sup> In addition to these foreign pensions, the older households of Kabylia receive twice as many Mujahidin pensions as households in Nedroma.

### *Impact of Differences in Characteristics across Households: DFL Approach*

Whereas the previous analysis has focused on average differences, in order to understand poverty and inequality, it is necessary to examine the whole distribution of household incomes. The DFL technique provides for precisely this type of analysis. By reweighting the characteristics of households of one type (e.g., those with migrants) to reflect that of another type (e.g., those without migrants), we can directly examine the effect that different distributions of characteristics have on income distributions, without having to make assumptions about differences in returns to observable characteristics. Similarly, because the same households are used, there is no need to assume independence between observable and unobservable characteristics, although the reweighting will change the implied distribution of unobservable characteristics in the DFL counterfactual scenario.

When pooling both regions, it appears that households with and without migrants differ significantly according to the characteristics that are important for the determination of income (Figure 1). Households with migrants have characteristics associated with higher levels of income than households without migrants. This reinforces the need to control for selection into migration. When focusing on households with migrants, only limited differences appear between households that receive transfers and those that do not. Households receiving money from abroad have characteristics associated with slightly more income than those who do not, although neither distribution stochastically dominates the other.<sup>18</sup>

<sup>17</sup> Of course, not all pensioners return to live in Algeria on retirement – some send part of their pension home, while spending their time in both countries.

<sup>18</sup> The right panel of Figure 1 would suggest a non-monotonic relation between the expected residual of a selection (into remittance) equation and income. A monotonic selection correction, such as that of Heckman (1979), will be unable to appropriately capture this effect. This proved to be the case empirically, because the introduction of an additional selection criterion based on a remittance receipt caused the models to fail to converge. Accordingly, this selection criterion is not included in the econometric models (see subsection *Impact of Migration on Poverty and Inequality: Parametric Counterfactual Analysis* in Section IV).

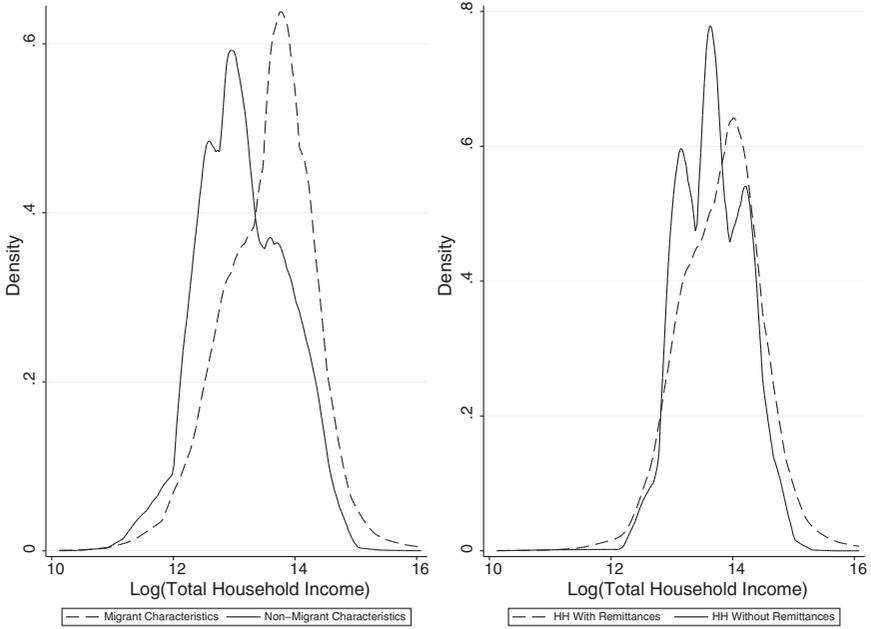


Fig. 1. DFL comparison of household income distributions, with/without migrants and with/without transfers (both regions pooled)

The differences between migrant and non-migrant households found in the aggregate are also found in each region, although the differences in observable characteristics between migrant households receiving and not receiving remittance move the reweighted distributions in opposite directions (Figure 2). For both Idjeur and Nedroma, migrant households have characteristics associated with more household income than non-migrant households. Among households with migrants, transfer-receiving households have characteristics that tend to be associated with more household income than non-receiving households in Idjeur. Note that this is not a result of the amount of the transfer, because the DFL technique does not remove transfers from the counterfactual distribution, it only reweights transfer-receiving households to have their observable characteristic distributions resemble those of non-receiving households. However, in Nedroma, the households that receive transfers have characteristics associated with slightly lower household income across the distribution, although the difference is minor. Given that Nedroma has more households with migrants than Idjeur, this could explain the lack of clear separation between the transfer-receiving and non-receiving distributions in Figure 1.

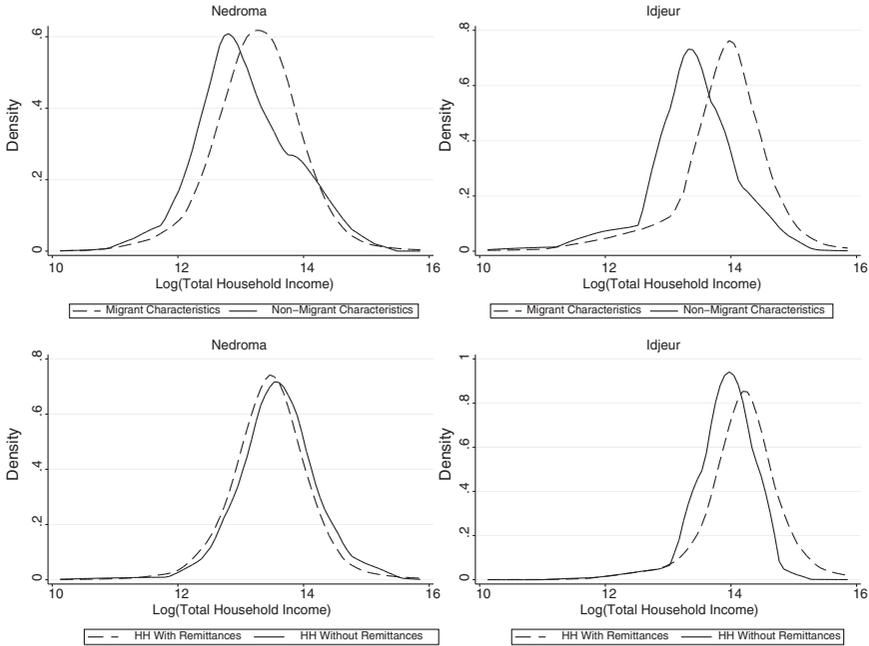


Fig. 2. DFL comparison of household income distributions, with/without migrants and with/without transfers, for Nedroma and Idjeur separately

## VI. Impact of Migration on Poverty and Inequality

### Estimation Results

The results of estimating the models described in subsection *Impact of Migration on Poverty and Inequality: Parametric Counterfactual Analysis* in Section I are presented in Appendix C and concern the three types of domestic individual income: (i) wage earnings; (ii) self-employment income; (iii) domestic retirement pensions. As noted, these models are used to build counterfactual household income, and they control for selection bias in the estimation of the individual level income equations. In this sense, it is important to note that the coefficient on the inverse Mill's ratio is significant for the self-employment income model at the 1 percent level, confirming the existence of a correlation between the error terms of the non-migration and self-employment selection equation and self-employment income at the individual level. The negative sign of the coefficient suggests that those who did not satisfy the selection criterion (migrants, wage employees, and those not working) would, on average, have earned more than those currently observed as self-employed. However, this does not mean that

they would have earned more than if they were wage employees or that their utility from being self-employed would have been higher than what they draw from being wage employees or migrants, or from not working.

With regards to the different income models, the results are broadly consistent with what has been found in the literature. Wage earnings increase significantly with education (especially high-school level) and are concave in age, while household assets are also a significant determinant. Self-employment income also increases with education but is convex in age, with the number of elderly people in the household also contributing positively to self-employment income. Household assets also affect self-employment income,<sup>19</sup> as does having access to the network of civil servants by having one in the family. Domestic pensions are found to be higher in Idjeur than in Nedroma,<sup>20</sup> although having more elderly people in the household negatively affects local pension income, perhaps reflecting intra-household labor supply decision-making among the elderly when they were younger.

The results concerning the selection equations also present numerous significant variables whose signs correspond to expectations, including the exclusion restrictions. Focusing on the selection equation for self-employment, men are found to be more likely to be self-employed non-migrants than women, individuals in households with more working-age people are more likely to be self-employed non-migrants, and the probability of being a self-employed non-migrant is found to be concave in age. Having more males in the household reduced the likelihood of being a self-employed non-migrant, likely due to an increased probability of migration. Lastly, variables related to resources available for starting a firm, such as the asset indicator and Mujahidin pensions, also significantly increased the likelihood of being a self-employed non-migrant. It is worth mentioning that, in addition to significantly explaining selection, the excluded variables were found not to be significantly correlated to the model residuals for both the

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<sup>19</sup> The negative coefficient might reflect heterogeneity in the types of household activities undertaken. Because the asset indicator is largely dependent on capital associated with lower-productivity production, households with higher values of the asset indicator might be disproportionately in the lower-productivity self-employment sector, while higher-productivity self-employment requires different assets such as computers, which are largely captured by the (not included) second axis of the MCA. Household assets are also positively associated with the likelihood of being self-employed (as seen by the selection equation for the self-employment model), suggesting that they can serve as collateral for starting a new business.

<sup>20</sup> During the 1970s, many people were employed in jobs in Alger or in the south of Algeria (Hassi Messaoud) in the petroleum sector as temporary domestic migrants. These people earned higher wages during their working lives, and thus accumulated more pension rights. Anecdotal evidence suggests that employers particularly targeted more rural and remote communities, such as those of Kabylia, where local employment opportunities were less prevalent.

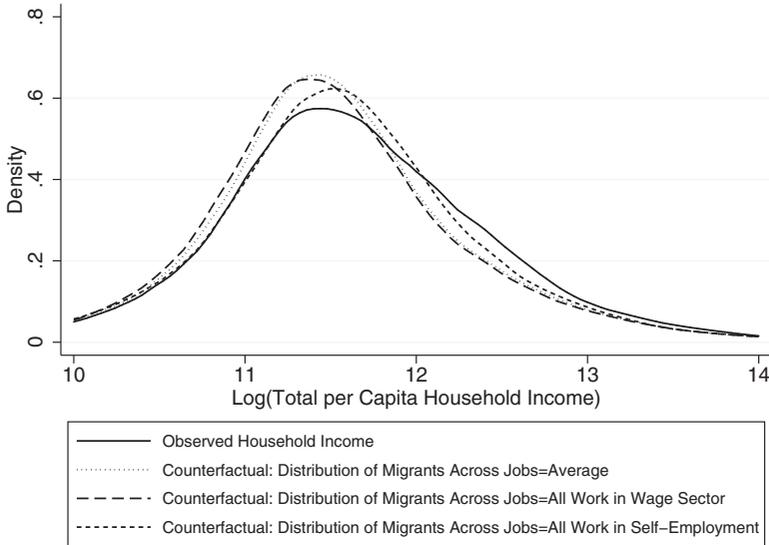


Fig. 3. Household income distributions for the two regions pooled

wage earnings and self-employment income equations ( $p$ -values of 0.28 and 0.16, respectively). This reinforces the validity of the exclusion restrictions adopted in the estimation.

Concerning the domestic pensions of the elderly, the selection equation shows several expected results, such as men being more likely to have local pensions, and households with more elderly people being more likely to have local pensions, because households without elderly people necessarily have no local pensions. Another interesting result is that individuals in households that own land have a lower probability of earning a domestic pension than others. This is likely to be due to the fact that the elderly people of these households had a higher risk of working as farmers when they were younger, and accumulated no pension rights.

### *Implications for Household Income*

With these estimates, we can simulate and compare observed and counterfactual household income in order to measure the differences due to migration and transfers. Figure 3 shows the observed per capita household income distribution and the expected per capita household income distributions in each counterfactual scenario (full reallocation approach),<sup>21</sup> pooling

<sup>21</sup> The counterfactual curves plotted in this section do not include the draws from the residual distribution, and as such are not directly comparable to the median counterfactuals discussed below.

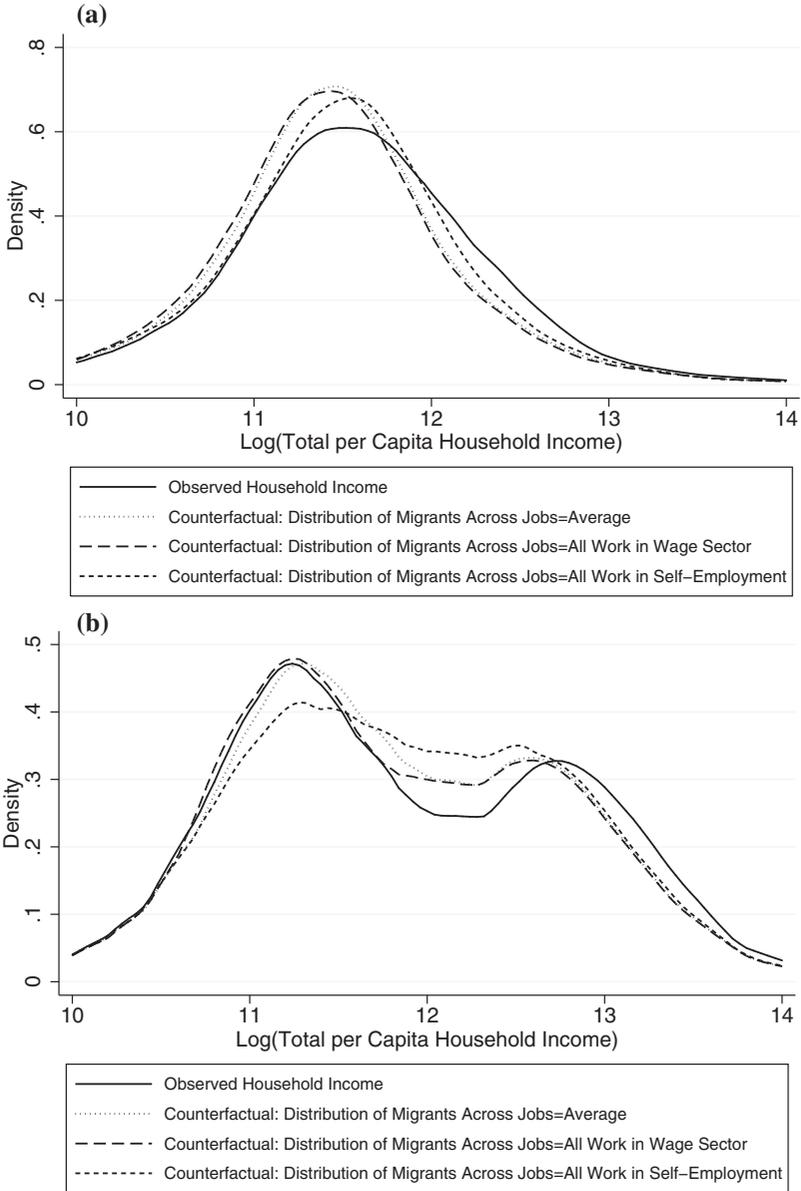
both regions. In Algeria, the expected income from a self-employment job is higher than that from a salaried job, as suggested by the difference in constants in Appendix C. The counterfactual income scenario that assumes all employment is self-employment<sup>22</sup> should thus be seen as an upper bound for income in the counterfactual setting under which all observed migrants stay in Algeria. The alternative extreme scenario, in which all employment is wage employment, should be seen as a lower bound for income. A more credible scenario (“Average” in Figure 3) is the one where the share of wage versus self-employment is held constant at the level observed in each sex–region–education cell.

Figure 3 shows that there is a shift in the position of middle-income households to a situation of higher incomes when people can migrate. The proportion of poor households is also higher in the counterfactual income distributions without migration. This is a first indication that migration reduces poverty in Kabylia and Tlemcen. In addition, comparison of counterfactual scenarios shows that shifting employment toward self-employment in the hypothetical case without emigration also reduces poverty, but by less than having somebody migrate.

Because of its relative size, the results for Nedroma (Figure 4(a)) are similar to those described for the pooled sample of Algerian regions. There are some specificities for Idjeur. First, Idjeur has two households with the log of per capita observed household income less than 10 (roughly DZ/A 22,000, off the graph to the left), but three households in the self-employment counterfactual scenario, and four households in the wage employment counterfactual scenario. There are no such households in Nedroma; the smallest observed log per capita household income is DZ/A 34,000 versus DZ/A 5,000 in Idjeur. Second, a more unequal distribution of income is observed in Idjeur, with a bipolarity of households around the median, a moderately poor group, and a moderately rich group. Finally, the curves show that beyond reducing the number of households earning less than DZ/A 22,000, income transfers from abroad appear to go to households in the middle of the per capita income distribution, as the observed density is lower than the counterfactual density for these households and higher at the upper income levels.

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<sup>22</sup> Recall that all counterfactual scenarios suppose that the total non-employment rate remains fixed at the observed level, and thus the differences between scenarios reflect alternative hypotheses about the type of job people occupy when employed.



*Fig. 4.* Household income distributions for the two regions separately: (a) Nedroma; (b) Idjeur

*Impact of Counterfactual Scenarios on Poverty*

In the absence of an official poverty line,<sup>23</sup> and for comparability with other countries, the more detailed analysis of the impact of migration on poverty focuses on two measures: extreme poverty, defined by the World Bank as a household with a per capita income lower than \$1.25 in purchasing power parity (PPP), equivalent to DZ/A 37,000 annually;<sup>24</sup> the \$2 per day in PPP poverty line, equivalent to DZ/A 60,000 annually. Our calculations compare the observed poverty rate (with migration), and the three counterfactual poverty rate scenarios described in subsection *Impact of Migration on Poverty and Inequality: Parametric Counterfactual Analysis* in Section IV.

Measured according to the \$2 per day poverty line, both regions studied here are somewhat poorer than the average poverty rate in the Maghreb region.<sup>25</sup> In the pooled sample, 19.5 percent of households live below the standard poverty line of \$2 (see Table 1) in 2011, observed with migration.

The impact of emigration is significant and positive, as is the case for most studies on the subject, when considering a poverty rate of \$2 per day at PPP (or DZ/A 60,000 per year). The counterfactual poverty rate would have been 35.4 percent in the average scenario, or 15.9 points higher in the case with no migration. Thus, our estimates suggest that emigration roughly halves the number of people living below the average poverty threshold (\$2 per day).

The other counterfactual scenarios can serve as bounds for the potential impacts of migration on poverty if the hypothesis of the structure of employment remaining stable were to be unjustified. If the counterfactual situation corresponded to the most advantageous hypothesis (all working people being self-employed) and coefficients remained stable, then the reduction in poverty would have been much smaller, because the counterfactual poverty rate would have been 27.7 percent and thus the emigration-induced decrease would have been 8.2 percentage points. However, if all working people were in wage employment, the poverty rate would have been much higher (42.8 percent) and emigration would have reduced poverty by 23.3 percentage points.

The results for extreme poverty are particularly remarkable. Measured against the threshold of \$1.25 per day at PPP, the rates of most countries

<sup>23</sup> In the case of Algeria, information about the national poverty line is unfortunately not available in the official statistics data (Office National des Statistiques).

<sup>24</sup> \$1.25 per day, at PPP, is equivalent to \$0.78 per day in Algeria, or DZ/A 102 per day at the official exchange rate (in 2011), which becomes DZ/A 37,000 annually. The standard poverty threshold of \$2 per day (at PPP) comes out to DZ/A 164 per day at the official exchange rate (in 2011), or DZ/A 60,000 per year.

<sup>25</sup> \$2 per day poverty in the Maghreb region fell from 19.7 percent in 1990 to 16.3 percent in 2005.

Table 1. *Poverty rates in the communes of Idjeur and Nedroma: observed rates and counterfactuals (with no migration)*

	Observed income	Counterfactual household income		
		Average	Wage	Self
<b>Both regions: Nedroma and Idjeur</b>				
< 37,000 DZ/A, \$1.25	6.85	14.69 [11.12; 19.19]	23.09 [18.43; 27.88]	10.71 [7.51; 15.06]
< 60,000 DZ/A, \$2	19.48	35.41 [30.65; 40.83]	42.77 [37.79; 48.15]	27.68 [23.62; 32.06]
<b>Nedroma</b>				
< 37,000 DZ/A, \$1.25	7.96	15.53 [11.11; 20.81]	24.47 [18.98; 30.28]	11.48 [7.62; 16.79]
< 60,000 DZ/A, \$2	19.49	35.67 [30.29; 42.06]	43.78 [37.95; 49.75]	27.85 [23.02; 32.87]
<b>Idjeur</b>				
< 37,000 DZ/A, \$1.25	1.98	10.11 [8.48; 15.72]	16.63 [11.12; 22.51]	6.84 [5.87; 10.85]
< 60,000 DZ/A, \$2	19.43	33.84 [28.42; 39.69]	38.65 [32.14; 43.16]	26.05 [24.09; 30.89]

*Notes:* Counterfactual columns present median poverty rates over 1,000 simulations, with the 2.5th and 97.5th percentiles in square brackets. Households are weighted by the number of members residing in Algeria in the observed case, and the total number of members in the counterfactual cases.

in the Middle East and North Africa are relatively low: extreme poverty generally affects less than 4 percent of the population (with the exception of Yemen, which is the only low-income economy in the region in which the poverty rate has increased in recent years). In the case of the Nedroma and Idjeur samples studied here, the rate of extreme poverty observed is slightly higher, at 6.9 percent, with the families that live in extreme poverty often being headed by women with children and/or having elderly members (parents) who are unable to work. Extreme poverty calculated from counterfactual income without migration in the intermediate scenario would have been higher (14.7 percent), exceeding the observed extreme poverty rate by 7.9 percentage points. As in the case of \$2 per day poverty, emigration from Kabylia and Tlemcen also reduces extreme poverty, dividing the share of affected individuals living below the extreme poverty line by a factor of more than 2.

Despite the loss of local income due to emigration, foreign transfers, even at low levels, typically provide enough income to lift the receiving household out of extreme poverty. The following two factors help to explain this.

- (i) A migrant only has to transfer the equivalent to the poverty line – around 15 euros monthly – to lift a person in the household out of

extreme poverty. We find that emigrants transfer, on average, DZ/A 40,000 per year (350 euros) in our pooled sample.

- (ii) The unofficial exchange rate yields a purchasing power premium of 50 percent, compared to the official exchange rate, and Charmes (2010) showed that more than 90 percent of transfers were converted at this rate.

A pensioner who transfers a very low pension earned in France, equivalent to 600 euros per month, back to Algeria can obtain DZ/A 90,000, at the unofficial exchange rate of one euro to DZ/A 130 (the average over 2009–2011).<sup>26</sup> This amount is nearly five times the Algerian minimum wage.<sup>27</sup>

*Regional Specificities Matter.* The prevalence of extreme poverty is an important difference between the two regions of our investigation. In the region of Tlemcen (Nedroma), the observed rate of extreme poverty is four times higher: 8 percent compared to only 2 percent in Idjeur. Transfers from migrants divide the rate of extreme poverty by 5 in Idjeur relative to the intermediate scenario. Because the obligation to remit is weaker in Nedroma than in Idjeur, transfers only reduce extreme poverty by a factor of 2 in Nedroma. In fact, households suffering from extreme poverty in Tlemcen differ from those in Kabylia in one important way: 15 percent of them have emigrants among their members who remit nothing compared to only 11 percent of households in Idjeur. This implies that households with migrants in Nedroma are more at risk of a double loss: less domestic revenue (because the migrant is not working in Algeria) combined with a relatively frequent absence of remittances to offset the loss. The plight of extremely poor households with migrants who do not send remittances is a recurring theme in popular Algerian songs: the theme of exiled emigrants who abandon their families and slide into despair and alcohol was the subject of ethnographic research in the 1970s (Sayad, 1999). Migration is seen as a curse in this setting, a net loss for the family. Although families in this situation have always been in the minority, the problem clearly persists and is visible in the data studied here.

### *Impact of Counterfactual Scenarios on Inequality*

Many analyses have summarized differences in inequality by comparing Gini coefficients, while more recent studies also analyze the Theil index

<sup>26</sup> For comparison, the official rate over this period averaged one euro to DZ/A 100.

<sup>27</sup> The minimum monthly income in Algeria was DZ/A 15,000 in 2011 (100 euros at the unofficial exchange rate). For comparison, the daily wage of a construction worker is DZ/A 1,000 or about seven euros.

Table 2. *Distribution of incomes: Gini coefficients by scenario*

Gini coefficient	Observed income	Counterfactual household income		
		Average	Wage	Self
<b>Both regions: Nedroma and Idjeur</b>				
	0.375	0.370	0.450	0.373
Gap (Obs – Cfc)		[0.345; 0.404]	[0.408; 0.503]	[0.351; 0.398]
		0.005	–0.075	0.002
		NS	*	NS
<b>Nedroma</b>				
	0.348	0.357	0.444	0.362
Gap (Obs – Cfc)		[0.326; 0.398]	[0.394; 0.511]	[0.335; 0.393]
		–0.008	–0.096	–0.013
		NS	*	NS
<b>Idjeur</b>				
	0.439	0.420	0.459	0.416
Gap (Obs – Cfc)		[0.403; 0.449]	[0.429; 0.543]	[0.398; 0.448]
		0.019	–0.020	0.023
		NS	NS	NS

*Notes:* Counterfactual columns present median Gini indices over 1,000 simulations, with the 2.5th and 97.5th percentiles in square brackets, as well as the difference with respect to the observed situation and an indicator of significance. Households are weighted by the number of members residing in Algeria in the observed case, and the total number of members in the counterfactual cases. \* means that the coefficient is significant within the 95% confidence interval. NS denotes non-significant.

as a complement because it is more sensitive than the Gini coefficient to changes in the tails of the distribution. The discussion below considers the impact of migration on inequality through both of these lenses.

The observed Gini coefficient (with migration) for the two regions in our sample (0.38 in Table 2) is a little higher than the statistic for the whole of Algeria (0.35).<sup>28</sup> As noted in the subsection *Implications for Household Income* of Section VI, the distribution of income distribution is more unequal Idjeur (0.44).

Table 2 shows that the Gini coefficients calculated on the simulated counterfactual income levels are rarely significantly different from the Gini coefficients calculated on the observed household income. The scenario in which all working individuals have wage jobs under the counterfactual is the only scenario in which a significant change in inequality is observed, and this only holds in Nedroma (and the combined sample). In this scenario, migration reduces inequality by 9.6 points, although it is possible that the decrease in the Gini coefficient associated with migration is masking more complicated shifts in the tails of the income distribution.

Table 3 shows the impact of migration on inequality, decomposing the effect by source of income. The first point of note is that pensions from

<sup>28</sup> See <http://www.statistiques-mondiales.com/gini.htm>.

Table 3. *Decomposition of inequality index*

Source	$S_k$	$R_k$	$G_k$	$S_k R_k G_k$	Share	% change	Outcome
<b>Both regions: Nedroma and Idjeur</b>							
Remittances	0.1063	0.5983	0.8583	0.0546	0.1457	0.0393	Deterioration of GINI
Foreign pensions	0.0906	0.8270	0.9651	0.0723	0.1928	0.1022	Deterioration of GINI
Local pensions	0.1159	0.5686	0.8986	0.0592	0.1580	0.0421	Deterioration of GINI
Local activity income	0.6604	0.6432	0.3963	0.1683	0.4490	-0.2114	Improved GINI
Mujahidin pension	0.0268	0.7789	0.9813	0.0204	0.0545	0.0278	Deterioration of GINI
	1.0000	-	-	0.3749	1.0000	0.0000	
<b>Nedroma</b>							
Remittances	0.1206	0.6084	0.8244	0.0605	0.1377	0.0171	Deterioration of GINI
Foreign pensions	0.0576	0.7311	0.9644	0.0406	0.0926	0.0349	Deterioration of GINI
Local pensions	0.1186	0.5982	0.8907	0.0632	0.1439	0.0253	Deterioration of GINI
Local activity income	0.6883	0.6866	0.3688	0.1743	0.3970	-0.2913	Improved GINI
Mujahidin pension	0.0148	0.6706	0.9818	0.0098	0.0222	0.0074	Deterioration of GINI
	1.0000	-	-	0.3484	1.0000	0.0000	
<b>Idjeur</b>							
Remittances	0.0596	0.7333	0.9659	0.0422	0.0962	0.0365	Deterioration of GINI
Foreign pensions	0.1984	0.8925	0.9414	0.1667	0.3796	0.1812	Deterioration of GINI
Local pensions	0.1071	0.3851	0.9053	0.0373	0.0850	-0.0221	Improved GINI
Local activity income	0.5691	0.5128	0.4920	0.1436	0.3270	-0.2421	Improved GINI
Mujahidin pension	0.0658	0.7804	0.9600	0.0493	0.1122	0.0464	Deterioration of GINI
	1.0000	-	-	0.4391	1.0000	0.0000	

Notes: The decomposition follows Lerman and Yitzhaki (1985), and the marginal effects follow Stark *et al.* (1986b).

retired migrants play a large role in the decomposition of the Gini index, according to the approaches of Lerman and Yitzhaki (1985) and Stark *et al.* (1986b). The decomposition is based on three components: (i)  $S_k$ , or the share of the source in overall income; (ii)  $G_k$ , or the Gini index associated with the distribution of income; (iii)  $R_k$ , or the correlation of the Gini index of this source with total income.

Income from foreign sources results in a higher level of inequality, whereas local earnings serve to equalize incomes. Foreign pensions are the income source that contributes the most to a higher Gini coefficient, increasing it by over 19 percent. The marginal effect of foreign pensions on inequality is such that an increase in household income of 1 percent due to foreign pensions would lead to a rise in inequality of 0.1 percent for the pooled sample (the last column of Table 2). Because retired ex-migrants can also combine their foreign pension with local self-employment income, household income might rise even more. Foreign pensions contribute much more to inequality in Idjeur than in Nedroma, as the marginal effect of this income source on the Gini coefficient is six times higher in Kabylia.

One disadvantage of using the Gini coefficient to characterize inequality is that different income distributions can generate identical values for the Gini coefficient. For this reason, the analysis of the Gini coefficient is

Table 4. *Distribution of incomes: Theil indices by scenario*

Theil index ( $\theta = 1$ )	Observed income	Counterfactual household income		
		Average	Wage	Self
<b>Both regions: Nedroma and Idjeur</b>				
	0.265	0.203 [0.179; 0.258]	0.248 [0.212; 0.322]	0.217 [0.192; 0.251]
Gap (Obs – Cfc)		0.062 NS	0.018 NS	0.049 *
<b>Nedroma</b>	0.231	0.192 [0.163; 0.257]	0.260 [0.197; 0.331]	0.207 [0.176; 0.201]
Gap (Obs – Cfc)		0.039 NS	–0.029 NS	0.024 NS
<b>Idjeur</b>	0.345	0.247 [0.228; 0.284]	0.275 [0.244; 0.338]	0.255 [0.232; 0.309]
Gap (Obs – Cfc)	0.098	0.070 *	0.089 *	* *

*Notes:* Counterfactual columns present median Theil indices over 1,000 simulations, with the 2.5th and 97.5th percentiles in square brackets, as well as the difference with respect to the observed situation and an indicator of significance. Households are weighted by the number of members residing in Algeria in the observed case, and the total number of members in the counterfactual cases. \*means that the coefficient is significant within the 95% confidence interval. NS denotes non-significant.

complemented with an analysis of the Theil index in order to better examine changes at the top and bottom of the income distribution. Table 4 presents Theil index calculations for the observed and counterfactual scenarios.

The Theil indices presented in Table 4 suggest a slightly different picture than the Gini coefficients of Table 2, namely that inequality in Idjeur might have increased as a result of migration. The analysis in the previous subsection suggested that migration was very helpful in reducing extreme poverty in Kabylia. However, foreign pensions, which are a huge component of household income (especially in Idjeur), are received by households in the upper part of the distribution. This might explain the observed rise in the Theil index: in addition to reducing extreme poverty by allowing for remittances to reach the lower tail of the distribution, migration makes some middle-income households wealthier by providing them with foreign pensions, which are of a larger amount than remittances.

## VII. Conclusion

In this paper, we examine the impact of migration on poverty incidence and inequality in two selected high-migration districts in Algeria: Kabylia and Tlemcen. Simulations based on multiple counterfactual (non-migration) hypotheses all indicate that emigration reduces poverty in a significant and quantitatively large manner in both districts. Poverty

reduction is found to be much larger in the district with the longer migration history.

Concerning inequality, we find that migration leads to a large decrease in inequality only in the counterfactual scenario, where everyone who works in the non-migration setting is assumed to have a wage job, and only in Nedroma (in the Tlemcen region). In a more reasonable scenario, where workers are assumed to be divided among wage and self-employment in the counterfactual situation according to the same shares as observed in reality, a decrease in inequality is also found, but it is not statistically significant. Our results concerning rural regions in Algeria are consistent with those of McKenzie and Rapoport (2007), who provide empirical evidence for an inverse U-shaped relationship between inequality and migration networks. Both of the Algerian sending regions studied here seem to be near the top of the inverse U-shaped relation between emigration networks and inequalities. In Kabylia in particular, the inequality-increasing effects of foreign pensions are partly offset by the inequality-reducing effects of remittances from overseas networks. Furthermore, our results suggest that the inverse U-shaped result needs to be nuanced in countries that export migrants and have longstanding relations with migrant receiving countries, such as the colonial links between Algeria and France, because of the inequality-enhancing effects of foreign pensions.

From a policy perspective, our results reaffirm the importance of the context for understanding the effects of emigration. The impact on the economies of the migrants' origin is very much linked to the characteristics of migrant families, as well as the specificities of the sending regions in the country of origin.

This study also highlights the vast importance of foreign pensions among transfers to these Algerian regions, where migration has a long history. Such pensions from migration are of a higher value than remittances, and play a major role in reducing poverty. There is a concern in Algeria about the dependence on this kind of transfer for the future, especially in Kabylia where older retired migrants tend to remit more than the new wave of emigration. There is a risk of a huge reduction in transfer income for poorer households (a large number of households survive because of these pensions) that would be irreplaceable by local sources of income.

Our study finds that foreign transfers currently help to reduce the number of people living below the \$2 per day poverty threshold by more than 40 percent, with poverty rates falling from 35.4 to 19.5 percent in the surveyed regions. The impact would be lessened if better local job opportunities were made available, but the lower bound estimate presented here still finds a reduction in poverty, due to migration, of 35 percent.

The reduction of extreme poverty driven by income from abroad is even more important. In Idjeur, where the power of village committees is very

strong, transfers and pensions from abroad divide the number of households living below \$1.25 per day by a factor of 5. The reduction is half as large in Nedroma because there are more extremely poor households who suffer from the phenomenon of “double loss”, when a person migrates but the family receives no transfer. Migration worsens poverty in these families.

To sum up the differences between the effects of migration on poverty and inequality across the two Algerian regions studied here, three hypotheses can be evoked.

- (1) The historical course of emigration matters. In Nedroma, emigration decreased after the independence of Algeria, unlike in Kabylia (Idjeur). As a result, the percentage of older migrants able to transfer their French pensions back to their families in the region of origin is 50 percent lower in Nedroma than in Idjeur.
- (2) The conditions of the local labor market are better in Nedroma than in Idjeur because it is less geographically isolated and better integrated into the national economy. Formal employment, which is more developed in Nedroma, contributes much more to the reduction of extreme poverty than in Idjeur.
- (3) Nevertheless, transfers from migrants play a much more important role in reducing extreme poverty than local income, especially in Idjeur. The proportion of migrants who remit money is higher for the migrants from Idjeur, likely due in part to the organization of the Kabyle diaspora in France, where village committees from the homeland are replicated and social pressure on diaspora members is likely to be stronger. The result is that the number of families that fall victim to the “double loss” phenomenon is much smaller in Idjeur than in Nedroma.

## **Appendices**

### **Appendix A: The Representativeness of the Survey**

To arrive at statistically acceptable representativeness, the survey carried out in Algeria drew on data from the RPGH 2008 census, for comparative purposes and to determine the readjustment weights of the sample. A Proc Calmar (SAS) is used for correction (marginal calibration). The variables used for correction are presented in Table A1, which records percentages taken from the survey with those calculated from the RGPH 2008 census. The calibration procedure was used separately for each commune. The readjusted data are representative of the two communes of Nedroma (6,738 households) and Idjeur (1,864 households), although they are not representative of the whole of Algeria.

Table A1. *Comparison of the structure of the Algerian sample and the RPGH 2008, by commune*

	Algeria Survey			Population, RPGH 2008		
	Idjeur	Nedroma	Overall	Idjeur	Nedroma	Overall
<b>Household equipment</b>						
Vehicle	45.9%	46.6%	46.3%	28.9%	25.7%	26.4%
Television	99.8%	99.7%	99.8%	93.5%	98.3%	97.3%
Stove	97.3%	95.7%	96.5%	70.3%	75.7%	74.5%
Air conditioning	49.8%	29.0%	39.4%	4.4%	5.8%	5.5%
Washing machine	57.2%	85.0%	71.1%	13.3%	49.4%	41.6%
Telephone line	54.7%	54.4%	54.6%	13.6%	45.3%	38.4%
Satellite antenna	92.3%	99.2%	95.8%	63.7%	89.7%	84.1%
Computer	24.3%	42.2%	33.3%	12.4%	8.8%	9.6%
Internet access	22.0%	25.9%	23.9%	1.5%	2.9%	2.6%
Secondary residence	2.8%	3.5%	3.2%	17.9%	3.1%	6.3%
<b>Services</b>						
Electricity	99.5%	99.5%	99.5%	97.8%	99.0%	98.7%
Natural gas	7.5%	82.0%	44.7%	2.8%	71.1%	56.3%
Public sewers	98.7%	92.0%	95.3%	90.4%	91.6%	91.3%
<b>Sex of household head</b>						
	78.2%	88.8%	83.5%	77.4%	83.7%	82.4%
<b>Housing</b>						
Two rooms	2.0%	7.7%	4.9%	11.3%	14.5%	13.8%
Three rooms	12.6%	17.2%	14.8%	25.3%	37.4%	17.2%
Four rooms	30.8%	25.7%	28.3%	23.3%	25.3%	24.9%
Five rooms	17.6%	16.7%	17.2%	14.4%	9.7%	10.7%
Six or more rooms	36.9%	32.7%	34.8%	21.1%	9.7%	12.1%
<b>Household size</b>						
Two people	11.0%	4.7%	6.8%	15.2%	13.5%	13.9%
Three people	27.8%	9.5%	18.7%	10.6%	12.5%	12.1%
Four people	32.3%	19.5%	25.9%	13.4%	16.9%	16.1%
Five people	18.1%	23.9%	21.0%	13.8%	22.4%	20.6%
Six or more people	10.8%	42.4%	26.6%	47.0%	34.7%	37.3%

**Appendix B**  
 Table B1. Table B1. Descriptive statistics for Nedroma and Idjeur

Commune Type of household	NEDROMA+IDJEUR						NEDROMA						IDJEUR												
	NOMIG		NOTRANS		TRANS		TOTAL		NOMIG		NOTRANS		TRANS		TOTAL		NOMIG		NOTRANS		TRANS		TOTAL		
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	
Share of households	0.33	0.32	0.35	0.33	0.33	0.38	1	0.29	0.33	0.33	0.38	1	0.53	0.29	0.18	1	0.53	0.29	0.18	1	0.53	0.29	0.18	1	
Total household revenue	454,133	476,961	787,101	577,308	454,385	431,371	709,992	544,964	453,503	714,571	1,544,623	726,255	374,035	67,352	374,035	67,352	374,035	67,352	374,035	67,352	374,035	67,352	374,035	67,352	
Household remittances	0	0	207,300	72,085	0	0	190,328	73,113	0	0	79,754	30,637	0	0	774,214	139,412	0	0	0	0	0	0	0	0	0
Household foreign pensions	0	0	143,913	50,043	0	0	79,754	30,637	0	0	79,754	30,637	0	0	774,214	139,412	0	0	0	0	0	0	0	0	0
Household local pensions	33,267	86,727	96,411	72,534	37,965	46,504	105,766	66,833	21,576	296,365	4,500	98,784	21,576	296,365	4,500	98,784	21,576	296,365	4,500	98,784	21,576	296,365	4,500	98,784	
Household local revenue	420,866	390,234	339,478	382,646	416,421	384,867	334,144	374,382	431,927	418,206	391,875	420,706	431,927	418,206	391,875	420,706	431,927	418,206	391,875	420,706	431,927	418,206	391,875	420,706	
Mujahidin pension	11,947	23,738	14,020	16,486	3,773	11,716	9,173	8,474	32,288	86,398	61,639	53,382	32,288	86,398	61,639	53,382	32,288	86,398	61,639	53,382	32,288	86,398	61,639	53,382	
Share with Mujahidin pension	0.02	0.04	0.04	0.03	0.01	0.03	0.04	0.03	0.04	0.09	0.09	0.06	0.04	0.09	0.09	0.06	0.04	0.09	0.09	0.06	0.04	0.09	0.09	0.06	
Share of male in household	0.53	0.55	0.51	0.53	0.54	0.55	0.51	0.53	0.49	0.54	0.50	0.50	0.49	0.54	0.50	0.50	0.49	0.54	0.50	0.50	0.49	0.54	0.50	0.50	
Household size	4.84	5.49	5.50	5.26	4.83	5.50	5.59	5.34	4.87	5.42	4.15	4.90	4.87	5.42	4.15	4.90	4.87	5.42	4.15	4.90	4.87	5.42	4.15	4.90	
Share of +65 years	0.02	0.06	0.11	0.06	0.02	0.04	0.11	0.06	0.01	0.16	0.17	0.08	0.01	0.16	0.17	0.08	0.01	0.16	0.17	0.08	0.01	0.16	0.17	0.08	
Education in years	5.42	6.24	6.10	5.92	5.97	6.19	6.17	6.12	4.06	6.52	5.47	5.03	4.06	6.52	5.47	5.03	4.06	6.52	5.47	5.03	4.06	6.52	5.47	5.03	
Share of households headed by men	0.95	0.90	0.83	0.89	0.94	0.96	0.83	0.90	0.98	0.59	0.87	0.85	0.98	0.59	0.87	0.85	0.98	0.59	0.87	0.85	0.98	0.59	0.87	0.85	
Index of physical capital	0.07	0.07	0.08	0.07	0.09	0.06	0.08	0.08	0.04	0.10	0.09	0.07	0.04	0.10	0.09	0.07	0.04	0.10	0.09	0.07	0.04	0.10	0.09	0.07	
Share of households with land	0.19	0.23	0.28	0.24	0.15	0.24	0.25	0.22	0.30	0.17	0.61	0.32	0.30	0.17	0.61	0.32	0.30	0.17	0.61	0.32	0.30	0.17	0.61	0.32	
Share with agricultural income	0.11	0.05	0.07	0.08	0.13	0.06	0.08	0.08	0.06	0.02	0.06	0.05	0.06	0.02	0.06	0.05	0.06	0.02	0.06	0.05	0.06	0.02	0.06	0.05	
Number of male children	2.53	3.00	2.82	2.78	2.61	3.02	2.89	2.85	2.35	2.90	2.06	2.46	2.35	2.90	2.06	2.46	2.35	2.90	2.06	2.46	2.35	2.90	2.06	2.46	
Rate of local unemployment	10.92	9.66	9.29	9.94	10.22	9.21	9.02	9.43	12.82	12.11	12.16	12.49	12.82	12.11	12.16	12.49	12.82	12.11	12.16	12.49	12.82	12.11	12.16	12.49	
Rate of local migration	0.16	0.16	0.15	0.16	0.15	0.14	0.14	0.14	0.20	0.22	0.22	0.21	0.20	0.22	0.22	0.21	0.20	0.22	0.22	0.21	0.20	0.22	0.22	0.21	
Share of households with civil servant	0.44	0.36	0.38	0.39	0.48	0.35	0.40	0.41	0.35	0.41	0.19	0.34	0.35	0.41	0.19	0.34	0.35	0.41	0.19	0.34	0.35	0.41	0.19	0.34	
Observations (after reweighting)	12,730	12,548	13,476	38,754	9,081	10,528	12,231	31,840	3,649	2,020	1,245	6,914	3,649	2,020	1,245	6,914	3,649	2,020	1,245	6,914	3,649	2,020	1,245	6,914	

## Appendix C

Table C1. *Estimation results*

	Wage earnings		Self-employment income		Local pension	
	Log (wage)	Selection	Log (self)	Selection	Log (local pension)	Selection
Male	0.144 (0.112)	0.665*** (0.068)	-0.531*** (0.113)	0.617*** (0.0744)	0.0959 (0.0616)	0.456** (0.186)
Male head of household		0.0436 (0.0433)		-0.0112 (0.0139)		-0.382* (0.202)
Idjeur	0.0664 (0.0617)	-0.158 (0.109)	-0.00218 (0.0833)	0.0529 (0.0907)	0.153*** (0.0435)	-0.00714 (0.151)
Number of persons under 15, local		0.0768 (0.058)	0.00518 (0.0589)	-0.016 (0.0555)		
Number of persons 15-65, local		0.185** (0.0825)	-0.024 (0.0671)	0.0564 (0.0636)		
Number of persons over 65, local		-0.024 (0.0681)	0.136* (0.0707)	-0.129** (0.0595)	-0.137** (0.0698)	0.373** (0.157)
Age	3.115*** (1.101)	3.208*** (0.523)	-1.666** (0.652)	2.358*** (0.647)		
Age squared/100	-2.966*** (1.128)	-3.466*** (0.542)	1.988*** (0.681)	-2.603*** (0.671)		
Agricultural income		-0.00517 (0.0469)		0.0253 (0.0165)		
Ownership of farmland		-0.0787 (0.0592)		-0.00797 (0.0198)		-0.498*** (0.144)
Asset index, first vector	-0.150** (0.0748)	-0.0751 (0.0611)	-0.153*** (0.0538)	0.201*** (0.043)		-0.00295 (0.271)
Primary education	0.0505 (0.0629)	0.146* (0.0771)	-0.0401 (0.0685)	0.0349 (0.0669)		
Secondary education	0.0355 (0.0765)	0.13 (0.0841)	0.205*** (0.0764)	-0.197*** (0.0694)		
High school	0.111** (0.0559)	0.0939 (0.0693)	0.224*** (0.0849)	-0.205*** (0.0756)		
Higher education	0.0308 (0.0657)	0.127* (0.0684)	0.296*** (0.0837)	-0.280*** (0.0762)		
Number of boys in the household		-0.189*** (0.0655)		-0.0276 (0.0257)		
Local rate of unemployment		0.0727 (0.0603)	0.0572 (0.0605)	-0.0855 (0.0585)		
Local rate of migration		-0.0655 (0.113)		0.0558 (0.0509)		
Mujahidin pension		0.0836* (0.0433)	0.0442 (0.0735)	-0.0991 (0.071)		-0.0898 (0.154)
Civil servant in the household	0.116 (0.0768)	0.398*** (0.0469)	0.285*** (0.0832)	-0.296*** (0.061)	0.0864 (0.0588)	-0.257* (0.135)
Constant	1.494*** (0.391)	-1.664*** (0.125)	5.502*** (0.281)	-1.925*** (0.15)	4.330*** (0.234)	-1.139*** (0.253)

Table C1. *Continued*

	Wage earnings		Self-employment income		Local pension	
	Log (wage)	Selection	Log (self)	Selection	Log (local pension)	Selection
$\text{Tan}^{-1}(\rho)$	0.0927 (0.141)		-3.143*** (0.205)		-0.711 (0.915)	
$\text{Log}(\sigma)$	-0.184** (0.075)		0.0222 (0.139)		-1.409*** (0.214)	
Number of observations	3,630	3,630	3,630	3,630	516	516
Log likelihood	-19,105	-19,105	-8,901	-8,901	-1,128	-1,128

Notes: Robust standard errors in parentheses. \*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ .

## Appendix D: Results with Counterfactuals Calculated According to the No-Reallocation Approach

Table D1. *Impact on poverty*

	Observed income	Counterfactual household income		
		Average	Wage	Self
<b>Both regions: Nedroma and Idjeur</b>				
Type 1 < 37,000 DZ/A, 1,25\$	6.85	16.22 [14.03; 18.39]	17.39 [14.85; 20.23]	15.43 [13.27; 17.53]
Type 2 < 60,000 DZ/A, 2\$	19.48	36.14 [34.11; 38.31]	37.84 [35.34; 40.51]	35.17 [33.11; 37.25]
<b>Nedroma</b>				
Type 1 < 37,000 DZ/A, 1,25\$	7.96	17.09 [14.39; 19.72]	18.41 [15.38; 21.84]	16.24 [13.64; 18.78]
Type 2 < 60,000 DZ/A, 2\$	19.49	37.61 [35.15; 40.25]	39.57 [36.56; 42.73]	36.57 [34.13; 39.12]
<b>Idjeur</b>				
Type 1 < 37,000 DZ/A, 1,25\$	1.98	12.24 [11.72; 13.21]	18.58 [11.99; 13.79]	11.69 [11.18; 12.38]
Type 2 < 60,000 DZ/A, 2\$	19.43	29.25 [25.89; 30.46]	29.56 [28.81; 31.02]	28.62 [27.94; 29.42]

Table D2. *Impact on Gini coefficient*

Gini coefficient	Observed income	Counterfactual household income		
		Average	Wage	Self
<b>Both regions: Nedroma and Idjeur</b>	0.375	0.377 [0.367; 0.396]	0.389 [0.376; 0.415]	0.375 [0.366; 0.391]
Gap (Obs – Cfc)		–0.002	–0.014	0.000
<b>Nedroma</b>	0.348	0.351 [0.339; 0.374]	0.364 [0.349; 0.397]	0.350 [0.338; 0.371]
Gap (Obs – Cfc)		–0.002	–0.016	–0.001
<b>Idjeur</b>	0.439	0.461 [0.453; 0.471]	0.464 [0.457; 0.478]	0.455 [0.449; 0.462]
Gap (Obs – Cfc)		–0.022	–0.025	–0.015
		*	*	*

Notes: Counterfactual medians and 2.5–97.5th centiles in square brackets. \*means that the coefficient is significant within the 95% confidence interval. NS denotes non-significant.

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