Conflict and Education Demand in the Basque Region

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Abstract
The relationship between conflict and education has been studied before. However, previous authors have always focused strongly on the supply-side effects, whereas this article examines the influence of conflict on the demand for education. It is theoretically shown that, under relatively general conditions, individuals living in a conflict area have an incentive to increase their level of education and that this effect depends on the individual’s skill level. This hypothesis is tested using the conflict in the Basque Region as a case study, which is an example of a conflict in which one would not expect strong supply-side effects. Using other Spanish regions, an artificial region is created in which the population has a similar educational distribution as in the Basque Region. When comparing the true and artificial regions, individuals with a medium education level clearly show an increase in education during the conflict, as predicted by the theoretical model.

Keywords
conflict, education, matching, Spain, Basque Region, demand for education

Introduction
The adverse effects of civil conflict on many factors that influence social well-being can be considered a well-established fact. For example, conflict researchers have previously examined the impact of conflict on health (Ghobarah, Huth, and Russett

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2004), human capital (Hoeffler and Reynal-Querol 2003), physical capital (Abadie and Gardeazabal 2003), economic growth (Murdoch and Sandler 2002), and education (Lai and Thyne 2007 and Ichino and Winter-Ebmer 2004). Furthermore, the causes of civil war (Djankov and Reynal-Querol 2007), particularly the impact of ethnicity (Fearon and Laitin 2003) on conflict and its spillover effects (Murdoch and Sandler 2002), are also topics discussed extensively in this literature.

However, it is well known that education plays an important role in economic growth (Barro 2001 and Wong and Yip 1999), equality (Gradstein 2003), and the role of females in society (Schultz 1995). Moreover, returns to education (García Prieto, Román, and Domínguez 2005 and Psacharopoulos and Patrinos 2004) is regarded an important topic as well as the basic consideration when making human capital investment decisions. Furthermore, education has an additional downstream effect: higher educated parents tend to have higher incentives to invest more in their children’s human capital (Göksel 2007).

Elaborating on the aforementioned literature, this article aims to analyze the impact of conflict on the demand for education. Observing this impact will help to clarify the implications of conflict on this particular element of social well-being. It is important to stress that, unlike previous articles (Lai and Thyne 2007; Ichino and Winter-Ebmer 2004), we aim to analyze the demand side of education, instead of the combination of demand and supply-side effects. We have chosen the Basque conflict as a case study because this conflict has not had strong supply-side effects on education, which gives us the opportunity to look at the isolated influence of conflict on the demand for education.

In the following section of the article, we provide a brief literature review. We introduce our theoretical model in the third section. In the fourth section, the empirical analysis and data are presented. The fifth section includes the results, and the final section concludes.

**Literature Review**

Several authors have previously looked at the influence of conflict on educational outcomes. An interesting contribution comes from Stewart, Huang, and Wang (2001), who find mixed results for changes in primary school enrollments in the conflict countries. Although they observe a fall in primary school enrollment in Angola, Mozambique, and Sierra Leone, the enrollment rate rises in Burundi, Guatemala, Afghanistan, Cambodia, and Uganda between the beginning and the end of conflict. However, they also show that the enrollment rates fell during the most severe years of the conflict in Afghanistan and Uganda.

Lai and Thyne (2007) use cross-sectional and time series methods to analyze the influence of conflict on education. The authors consider 2 mechanisms: the first channel entails the fact that civil wars are likely to destroy a state’s system of education through the loss of infrastructure and personnel. The second channel is the reallocation of resources from education to military expenses. Both channels concentrate on the
supply side of education. They find evidence for their first claim, as both expenditures and enrollment decline during periods of civil war, but they do not find any proof for the reallocation of education funds toward military spending during conflicts. Finally, the supposed decrease in education expenses is only valid for higher level conflicts.

Likewise, Ichino and Winter-Ebmer (2004) emphasize the supply side of education especially when they consider the impact of conflict on younger cohorts of primary school age. They compare the education level and earnings of Austrian and German individuals, who were 10 years old during World War II, with the ones in nonconflict countries, such as Switzerland and Sweden. They show that the individuals in conflict-affected countries received less education than the ones in countries at peace. Moreover, these individuals experienced a sizeable earning loss due to the educational loss resulting from conflict.

In their article, Hoeffler and Reynal-Querol (2003) investigate the costs of conflict. They separate the costs into two subgroups consisting of economic and human costs. They also consider the long-term effects of civil war, taking into account mortality rates among children, HIV in the military, and the psychological damage of conflict. Surprisingly enough, they do not consider the impact of civil wars on education while performing these analyses.

According to Arrazola and De Hevia (2006), who use the Spanish Civil War as an instrumental variable to research the rates of return to education for men and women, there are three main reasons why educational attainment decreases during war periods. This includes difficulties in the physical access to schools, the decline in financial means for school attendance, and the need for children to leave school to earn money for their family.

In this article, we are interested in the impact of the Basque conflict, which is not an actively armed conflict and thus does not cause physical bans or damage to the schooling system. Our claim is that it may still influence the incentives to acquire education, due to changes in the returns to schooling. Basically, our main interest is the demand side of the schooling system instead of the supply side. To our knowledge, this is the first article that analyses the way conflict affects the demand for education.

Brain Gain Versus Brain Drain

Our hypothesis is related to the ongoing debate of brain gain versus brain drain in migration literature. It has been claimed that migration decreases economic growth and the average education level of the source country due to the departure of the more highly educated and more intelligent people (Bhagwati and Hamada 1974 and Haque and Kim 1995). Building on that, Wong and Yip (1999) claim that brain drain reduces the economic growth rate and has a detrimental effect on nonemigrants in the source country through income-distributional effects and reduced human capital accumulation. Wong and Yip show that if the initial rate of human capital accumulation is relatively low, a representative nonemigrant’s sum of discounted income and life time utility could decrease.
Recently, however, researchers have shown that migration may in fact have positive effects for the source country (e.g. Mountford 1997 and Stark 2004). Borjas (1994) investigates the economics of immigration in detail and evaluates both the positive and the negative consequences of migration. Using cross-section evidence, Boucher, Stark, and Taylor (2005) claim that the access of households to high-skilled internal migration networks increases the likelihood that children will attend school beyond the compulsory level. Furthermore, they provide evidence that if the returns to education are higher in the destination country, the incentive to invest in human capital will increase in the source country with a larger probability of migration. Likewise, Stark, Helmenstein, and Prskawetz (1997) claim that optimizing workers in the source country will invest more in education, if they have an opportunity to migrate and hence have higher expected returns to investment in human capital. Both of these articles stress that only a proportion of the educated residents ultimately migrates and that therefore, in the end, the average level of education of the remaining population increases as well. However, Beine, Docquier, and Rapoport (2001) consider both beneficial and detrimental effects of migration. Their supposed “brain effect” refers to the improved incentives for investment in education as a result of improved migration opportunities, similar to the previously mentioned authors. The second impact of migration, referred to as the “drain effect” is the departure of some, if not all, educated agents. Beine et al. go on to claim that the sign of the total impact of the migration depends on which effect dominates.

As mentioned before, the aim of this article is to analyze the impact of conflict on the demand for education. Civil conflict can have two different effects on education. It may either increase the incentives for education to be able to migrate out of the conflict region or reduce the incentives on human capital accumulation due to the problems caused by conflict and demoralization.

Methodological Literature

The methodology used in this article is inspired by Abadie and Gardeazabal (2003; henceforth, AG) who construct a synthetic control region, which resembles the Basque region, to be able to compare the economic evolution of that artificial region to that of the Basque region during the conflict era. The artificial region is constructed as a weighted combination of other Spanish regions chosen to resemble the characteristics of the Basque Region before the conflict. The authors find a 10 percent average gross domestic product (GDP) gap and provide evidence that changes in the per capita GDP gap are associated with the intensity of the conflict.

In the same style, Guidolin and La Ferrara (2007) employ a similar methodology to conduct an event study regarding the sudden end of the conflict in Angola due to the death of the rebel movement leader in 2002. They aim to find how the value of diamond mining firms responds to conflict episodes and to estimate the relationship between abnormal return and political tension. To achieve this, two portfolios are constructed: a portfolio with firms that have significant Angolan interests, and a
control portfolio that consists of companies that do not have such interests. Their results show that the end of the conflict decreases the abnormal returns of the Angolan portfolio rather than increase them. Their article is an important contribution to the literature not only because of the methodology used, but also because it proves that conflict may positively affect the interests of some agents.

The methodology of forming a synthetic region is relatively new in the conflict literature. Previous articles mainly use diff-in-diff methodology (Shemyakina 2006; Akresh and de Walque 2008) or they compare conflict and nonconflict countries (Ichino and Winter-Ebmer 2004). Finally, a few articles take a cross-country perspective toward the issue (Stewart, Huang, and Wang 2001).

All these other methodologies that have previously been explored have significant drawbacks that make it infeasible for us to use them. As we focus on only one country, cross-country analysis is out of the question. At the same time, the type of conflict (long-term, low-intensity) reduces the attractiveness of diff-in-diff analysis. Finally, as can be seen later, we expect there to be distributional effects that can be uncovered using the adjusted AG method that we propose in this contribution.

**Basque Conflict**

Before continuing this article, it is important to clarify the outline of the Basque conflict. The main actor of the Basque conflict is Euskadi Ta Askatasuna (ETA), Basque for “Basque Homeland and Freedom”, whose main aim is to promote the establishment of an independent Basque country. Although it was founded in 1959, ETA did not claim its first victim until 1968 (AG). Since then, ETA has killed 823 people and committed dozens of kidnappings. AG contains a table listing the number of killings and kidnappings by ETA between 1968 and 2000, which can be found in an appendix available online. From this table, it can be seen that the number of killings and kidnappings were low before 1973, but started to increase during the mid 1970s, peaking during the years of 1978–1980 (235 victims). After 1980, the number of killings decreased gradually. On average, ETA killed 39 people per year during the 1980s and this number is reduced to 19 per year during the 1990s. In September 1998, ETA declared a cease-fire, which lasted for 14 months and in 2000 ETA killed 23 people (AG). ETA’s main financial sources are kidnapping, extortion, and some robberies. For these activities, they have been mainly targeting Basque entrepreneurs. Another interesting thing is the fact that although ETA conducts its activities in almost all Spanish regions, most of its activities are concentrated in the Basque Region. According to the calculations in AG, almost 70 percent of the deaths caused by ETA in Spain during 1968–1997 took place in the Basque Region.

**Theoretical Model**

For the current article, we develop a naive theoretical model, which is merely used to outline our hypothesized changes in education as a result of a civil conflict.
As mentioned earlier, the model is not generally applicable to simply any conflict, because, different from previous authors, it focuses on the supply side of education, instead of on the demand side. Moreover, different from Stark, Helmenstein, and Prskawetz (1997), we emphasize the role of ability in the determination of the cost of migration. It is assumed that in the conflict region, as well as in the nonconflict region, education is sufficiently available and the level of education is determined primarily by the demands of the individual, instead of by supply constraints. This assumption may not necessarily hold when considering longer time periods, as freely accessible (tertiary) education is something that has only developed during recent decades, but the assumption can be adjusted to read that there is no difference in the supply of education between the conflict area and the nonconflict area.

The outline of the model is as follows: An economy is populated by individuals who all have a particular level of Ability. Using their level of ability, they decide to obtain a certain level of education and subsequently they decide whether to work in the home region or to migrate and work in the migrant region. Individuals are fully rational and therefore make all their decisions through rational optimization.

The basic assumptions that define the model are mostly related to the way migration influences an individual’s utility. In principle, it is assumed that there are no wage differences between the home and migration regions but that the utility differences stem from a more subjective analysis of costs and benefits. The costs of migration result from the adjustment process through which a migrant has to go. For example, they may have difficulty adjusting to a culture that is different from their own or, more importantly, there may be a language difference between the target and origin regions. An important assumption here is that this adjustment process is expected to be easier (i.e., less costly) for individuals with a higher level of education. The benefits of migration (which can be either negative or positive), however, are expected to be constant across education groups. Benefits may come from an improved labor market, a more pleasant environment, or any other effect that influences the incentives to migrate. In this case, we are particularly interested in the role of conflict in the region of origin, which functions as a bonus on moving away.

**Model Outline**

As mentioned above, the population consists of a continuum of individuals. These individuals differ in only two respects. First, they have an ability level $A_i \in [0; 1]$ and second, they are either susceptible to migration or not. In total, a proportion $\gamma$ is potentially interested in moving, whereas the rest $(1 - \gamma)$ is not. The first group is the group that we are interested in and whom our model concerns, whereas the latter is simply staying in the home region and not involved in any migration decision. The Ability level $A_i$ is the main determinant in the cost of acquiring education, where it obviously has a negative sign. The relationships between the cost of education ($CE_i$) and both $A_i$ and the chosen education level $E_i \in [0; 1]$ are convex, which yields the following type of cost function:
This cost function implies that the marginal benefit of Ability decreases. In other words, the costs required to achieve a given education level differ less between two marginally different high-ability individuals than between two marginally different low-ability individuals. Conversely, for an individual with a given level of ability, the marginal costs of education increase in the level of education, implying that an increase in education at the higher levels is more costly than a similar improvement at lower levels. For example, for an individual with $A_i = 0.5$, the cost of increasing their education level from 0.1 to 0.2 is 0.015, whereas the cost of increasing their level of education from 0.8 to 0.9 is 0.085.

In fact, the particular shape of the cost function is not relevant, as long as the initial conditions are met. The actual form of the cost function does not significantly influence the results. During the first stage of the model, individuals use this cost function to determine their optimal level of education, taking into account the expected payoffs from education at a later stage. That second stage is when the individuals take up jobs and start working either in the domestic market or the migrants’ market. The wages in these markets are principally the same and depend on the level of education of an individual and a factor $\omega > 0$:

\[ \omega_d(E_i) = \omega_m(E_i) = (1 + E_i)\omega \]  

However, living as a migrant has one additional benefit. Individuals who live as migrants receive a bonus of $\lambda \in [-\infty; \infty]$, which represents the benefit of living out of your own region. This benefit can come from different sources, such as the expansion of job opportunities or an increased appreciation for highly developed skills. Another possibility, however, is that there is a peace bonus to living in another region, when there is a conflict taking place in the home region. This is one of the channels through which we expect to see results. The second relevant channel is the costs incurred during migrating. These costs of migration ($CM_i$) consist of the fact that one is away from the home region, which may lead to problems of adjusting to a different culture and/or language. Particularly the language aspect is expected to be important and therefore, the costs of migration are decreasing in education. One way this function could look is as follows:

\[ CM_i(E_i) = (1 - E_i)\mu \]  

where $\mu \geq 0$ is related to the difficulty of the adjustment process between the two different cultures.

All this information is available to individuals when deciding whether to migrate or not. For this decision, they weigh the different levels of utility they would derive from migration and non-migration:

\[ U_i = (1 + E_d)\omega - E^2_d(2 - A_i)^2 \quad \text{if} \; \text{migr} = 0 \]  

\[ CE_i(E_i, A_i) = E^2_i(2 - A_i)^2 \]  

(1)
\[
U_i = (1 + E_m)\omega - E_m^2(2 - A_i)^2 + \lambda - (1 - E_m)\mu \quad \text{if}\ \text{migr} = 1
\]

**Solution**

It is easy to see that this model is simply a game with three stages:

1. Decide on education level \(E_i\), given \(A_i\).
2. Decide whether to migrate or not.
3. Work and earn.

We, therefore, solve the game through backward induction. At the third stage, no real decisions are taken and this stage is therefore ignored. At the second stage, however, there is an important decision to be made. The outcome of this decision depends on the utility levels that can be derived from migration and from staying in the domestic region. To be more precise, defining \(\hat{E}_d\) and \(\hat{E}_m\) as the optimal levels of education under the assumption that the individuals are either working domestically or as migrants, an individual decides to migrate when the following is true

\[
\left(1 + \hat{E}_m\right)\omega - \hat{E}_m^2(2 - A_i)^2 + \lambda - (1 - \hat{E}_m)\mu > \left(1 + \hat{E}_d\right)\omega - \hat{E}_d^2(2 - A_i)^2
\]

\[
\lambda - \hat{E}_d\omega + \hat{E}_d(\mu + \omega) - \mu > \left(\hat{E}_m^2 - \hat{E}_d^2\right)(2 - A_i)^2
\]

\[
\sqrt{\frac{\lambda - \hat{E}_d\omega + \hat{E}_m(\mu + \omega) - \mu}{\hat{E}_m^2 - \hat{E}_d^2}} > (2 - A_i)
\]

\[
\bar{A}_i = \bar{A}_i > 2 - \sqrt{\frac{\lambda - \hat{E}_d\omega + \hat{E}_m(\mu + \omega) - \mu}{\hat{E}_m^2 - \hat{E}_d^2}}
\]

From Equation 8, it can be seen that the decision to migrate depends on the equilibrium levels of Education, the individual Ability level, and several parameters. An individual prefers to migrate when her threshold ability level (\(\bar{A}_i\)) is larger than the right-hand side of the equation. Taking this into account, we move back to the first stage of the game in which individuals decide on their education levels. We calculate separately what the equilibrium levels of education are when migrating and when staying in the home region:

\[
\max_{E_i} U_i = (1 + E_d)\omega - E_d^2(2 - A_i)^2 \quad \text{if}\ \text{migr} = 0
\]

\[
\max_{E_i} U_i = (1 + E_m)\omega - E_m^2(2 - A_i)^2 + \lambda - (1 - E_m)\mu \quad \text{if}\ \text{migr} = 1
\]
Simply taking the First-Order Conditions for each of these two expressions yields the following:

\[ \frac{\partial U_{i,d}}{\partial E_d} = \omega - 2E_i(2 - A_i)^2 = 0 \]  
\[ E_d = \frac{\omega}{2(2 - A_i)^2} \text{ if } \text{migr} = 0 \]
\[ \frac{\partial U_{i,m}}{\partial E_m} = \omega - 2E_i(2 - A_i)^2 + \mu = 0 \]  
\[ E_m = \frac{\omega + \mu}{2(2 - A_i)^2} \text{ if } \text{migr} = 1 \]

These equilibrium levels of education depend on the parameters of the model, and the individual level of Ability, \( A_i \). It is important to note here that for a given level of Ability, an individual who decides to migrate will acquire a higher level of education than an individual who decides to stay at home, as long as \( \mu > 0 \). At this stage, we can insert Expressions 11 and 12 into Equation 8, to find the equilibrium after which individuals will find it more attractive to migrate and find work in the migration region:

\[ \tilde{A}_i > A_i = 2 - \sqrt{\frac{2(\omega^2 + (\omega + \mu)^2) - \mu}{(2(2 - A_i)^2)^2}} \]
\[ = 2 - \sqrt{\frac{\lambda - \tilde{E}_d\omega + \tilde{E}_m(\mu + \omega) - \mu}{(\tilde{E}_m - \tilde{E}_d)}} \]
\[ \in \lambda - \frac{\omega^2}{2(2 - A_i)^2} + \frac{(\omega + \mu)^2}{2(2 - A_i)^2} - \mu \]
\[ > (2 - A_i)^2 \left( \frac{\omega + \mu}{2(2 - A_i)^2} \right)^2 - \left( \frac{\omega}{2(2 - A_i)^2} \right)^2 \]
\[ \in \lambda - \mu + \frac{1}{2} \frac{(\omega + \mu)^2 - \omega^2}{(2 - A_i)^2} > \frac{1}{4} \frac{(\omega + \mu)^2 - \omega^2}{(2 - A_i)^2} \]
\[ \tilde{A}_i > A_i = \left( 2 - \frac{1}{2} \sqrt{\frac{\omega^2 - (\omega + \mu)^2}{\lambda - \mu}} \right) \]
So, apart from a number of coefficients, the decision whether to migrate depends solely on the level of Ability.

**Interpretation**

Unfortunately, the interpretation of Equation 13 is not very straightforward at first sight. There is, however, a way of graphically showing the implications from this equation. If we assume unity wage, so \( \omega = 1 \), Equation 13 becomes:

\[
\bar{A}_i > A_i = \left(2 - \frac{1}{2} \sqrt{\frac{1 - (1 - \mu)^2}{\lambda - \mu}}\right)
\]  \hspace{1cm} (14)

There are now only two coefficients left (\( \lambda \) and \( \mu \)), in addition to the level of Ability \( A_i \). The way this can be represented is by looking at the combinations \( \lambda \) and \( \mu \) that will give a particular threshold level of Ability above which it is attractive to migrate. In Figure 1, the threshold for choosing to migrate is shown as a function of the relevant characteristics. As can be seen, given \( \lambda \), an increased level of \( \mu \) requires a higher Ability level to be able to migrate. Conversely, keeping \( \mu \) constant, a higher \( \lambda \) indicates that the cutoff level of Ability is lower.

It is important to stop for a moment and consider the interpretation of Figure 1. Looking at an example, we know that with \( \lambda = 0.4 \) and \( \mu = 0.4 \), even individuals who have \( A_i = 0 \) are interested in migrating and working in a foreign region.

**Figure 1.** The combinations of \( \lambda, \mu, \) and \( A_i \) for which individuals decide to migrate or not.
However, when $\lambda = 0.2$ and $\mu = 0.5$, not even the top of the Ability distribution is going to be willing to migrate and work abroad. Of course, the real values of $\lambda$ and $\mu$ would be expected to be somewhere in the middle of these extreme examples.

The implications of Figure 1 should be obvious in the context of the current article. An outbreak of a relatively small-scale civil conflict in the domestic region is going to increase $\lambda$, which leads to an increase in migration, as long as the ex ante equilibrium is somewhere in the medium region. However, an autonomous shift of $\lambda$ will not merely change the size of migration but also the composition. After all, when for example $\lambda \approx 0.36$ and $\mu = 0.5$, any individual who is potentially interested in migrating needs $A_i \geq 0.5$ to have an incentive to migrate. This implies that the level of education of migrants is distributed between 0.5 and 1. Now, if due to the occurrence of a civil conflict, $\lambda$ increases and becomes $\lambda_{\text{new}} = 0.40$, the threshold level of Ability will go down to 0.3. This leads to an increase in migration but also to a reduction in the Ability level, which will now be distributed between 0.3 and 1.

The implication for education can be seen as follows: Of those individuals born in the domestic region, the increase in potential migrants will in fact increase the overall level of education. The average level of education for migrants, however, is going to fall, due to the increased presence of low-Ability individuals in the total pool of migrants.

The Basque Case

The case of the Basque civil conflict fits into the current model very well, particularly because Spain and the Basque region are politically unified. This reduces the Cost of Migration and increases the percentage of people who would potentially be interested in migrating. In this particular case, it is only the cultural and linguistic differences that make the move more difficult. Another major difference with the standard migration literature (e.g., Borjas 1994) is the fact that there are no legal differences between the education systems of the Basque and Spanish regions, so the problem of highly educated migrants ending up doing menial jobs does not take place here.

During the conflict, there have been no significant effects on the supply of education and any changes in education achievement are due to demand changes. In the next section, we analyze empirically what the presence of the Basque conflict did to the education achievements of Basque-born individuals. For this, we could look at the average educational achievement, but according to the theoretical model described here, the effects should be stronger in one particular part of the educational distribution. In fact, assuming that the combinations of $\lambda$ and $\mu$ do not take on extreme values that would lead to no or full migration, it can be expected that the shift as a result of the conflict takes place in the middle part of the educational distribution. This leads to an increased overall level of education and to a lower level of education for the population of domestic migrants from the Basque Region.
Empirical Analysis

In the previous section, we described a hypothesis on how the presence of civil conflict may influence education outcomes, even when a conflict does not influence the supply of education. To empirically test whether this hypothesis is true, we use a method based on AG and in this section we explain how. In a nutshell, the idea is that we use a data set on realized education for people born in different Spanish provinces and in different years, which is then used in an ordered probit analysis to take out the most obvious explanatory factors for education accomplishments. This first stage yields a data set on “residual education” for individuals from all different Spanish regions. At the second stage, the data set is split into one pre-conflict data set and one data set that covers the conflict period. Using the pre-conflict data set, we then apply a matching method to create an artificial region that exhibits the same characteristics as the Basque region, pre-conflict. After doing this, we compare the distributions of education in the true and artificial Basque Regions during the conflict, from which it is possible to conclude what the effect of the conflict on education is.

In the following subsections, the details of the analysis are explained more precisely.

First-Stage Regression

Different from the AG analysis, we choose to filter out the alternative explanatory factors of education level before creating the artificial region during the second stage. The data set we use are the 1991 and 2001 Census results, which report, among many other things, the realized education level of all interviewed individuals. Of course, to make sure that individuals will have completed their entire education, only those individuals who have reached the age of 25 at the time of the Census are included.

The education levels are given in levels between 1 and 10, representing everything from illiterate to PhD level. As these are categorical noncontinuous observations, the use of ordinary least squares is ruled out. Instead, we perform an ordered probit analysis, with education level as the dependent variable. The independent variables are the most ex ante obvious variables to explain the level of education. In an ideal situation, this would include variables like the wealth status of the individual’s family at the time of birth or the parental level of education, but unfortunately these data are impossible to obtain. The only totally exogenous explanatory variables that are available at the individual level are year of birth and gender. So although it is not possible to add further individual-specific control variables, there are several variables at the provincial level that add a significant amount of explanatory power. First of all, there is provincial GDP level. As this may be endogenous to the level of education of the population, it is important to have an ex ante level of GDP. Unfortunately, due to the specifics of the Spanish situation, there is very little available in terms of old provincial data, and we, therefore, use the oldest trustworthy source of data that can be found: GDP in 1967. Most importantly, this year
is before the actual start of the conflict and can, therefore, be considered a relevant explanatory variable.

The other provincial-level variables are related to the supply of education. After all, obtaining a higher level of education is largely dependent on the availability of educational institutions. As a proxy for the availability of lower levels of education, we use population density. After all, primary and secondary education are nearly universally available as long as there is a minimal mass of people. The only possible impediment to accessing these levels of education is the potential travel time to and from schools, which, again, is directly related to the population density in a province. To make sure there are no endogeneity issues, we use the population density at the provincial level at the nearest complete decade (1930, 1940, etc.) before birth. For tertiary education, we have used a more sophisticated method and set up a database on Spanish Higher Education. In subsection on Data, there is further explanation concerning the data collection, but it suffices to say that we use a dummy variable that says whether or not an institution of higher education is available in the province, 18 years after birth. Finally, to pick up any other province-specific effects, we add province-dummies for each of the 50 provinces in our dataset.6

Empirically, the Ordered Probit regression we estimate during the first stage looks as follows:

\[
\begin{align*}
\Pr(\text{edu}_{i,y,p} = \text{lvl}) &= \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_{50} \end{bmatrix} [D_1 \cdots D_{50}] + \beta_{51} \cdot \text{sex}_i + \beta_{52} \cdot \text{birth}_i + \\
&+ \beta_{53} \cdot \ln(gdp_{1967,p}) + \beta_{54} \cdot \text{dens}_{p,y} + \beta_{55} \cdot \text{uni}_{i,p,y+18} + \epsilon_{i,y,p}
\end{align*}
\]

(15)

where \(\text{edu}_{i,y,p}\) is the level of education of individual \(i\), born in year \(y\) in province \(p\). lvl represents the possible level outcomes for education.7 \(D_1 \cdots D_{50}\) are the provincial dummies, \(\text{sex}_i\) is a dummy variable taking value 1 when an individual is male, \(\text{birth}_i\) is the year of birth of the individual, \(gdp_{1967,p}\) is the 1967 GDP level in the province of birth, \(\text{dens}_{p,y} \) is the population density in the nearest full decade before birth and finally, \(\text{uni}_{i,p,y+18}\) is a dummy variable that takes value 1 when a university is present in the birth province when the individual reaches age 18.

As a result of the regression in Equation 15, we have probabilities for each educational outcome for every single individual. Using a simple measure, we then calculate the so-called residual education, \(\text{res}_i\) which is taken to the second stage of the analysis:

\[
\text{res}_i = \text{edu}_i - \frac{1}{10} \sum_{\eta=1}^{10} \Pr(2\eta_i)
\]

(16)

where \(\eta_i\) are the different levels of education that are obtainable. This measure of residual education includes two major groups of variables: inherent personal characteristics and conflict-related variables. As these personal characteristics can be expected to
be distributed relatively equally throughout the population, there should be no difference between individuals born in the Basque Region and those born outside of it. At the same time, we argue that the conflict-related variables are not due to the supply of education for the reasons argued above, but instead to the demand for education. However, the presence of conflict is still likely to affect the demand for education differently between people, which is something that cannot be assumed to be randomly distributed. Instead, this influence is expected to be different across levels of education.

Second Stage

The inspiration for the second stage comes from the AG contribution, which analyses the influence of the Basque conflict on economic growth. However, there are a number of significant differences between their methodology and ours. In AG an artificial region is constructed, with all the non-Basque regions as potential elements. Although we do the same in principle, an important distinction is the fact that we attempt to replicate the entire distribution of educational achievement, and not simply the average. For that reason, we split up all our data in ten different deciles, and perform the matching analysis upon each separate one. The next important difference is that in AG the explanatory factors of economic growth are replicated (such as the physical and human capital stocks) and the resulting levels of GDP are analyzed. As we have taken out the (few) obvious explanatory variables in the first stage of the analysis, it is feasible for us to simply create a matching of the outcome (level of education).

First, with $D_J$ as the total number of deciles from all $J$ potentially contributing regions to the artificial region ($D_J = 10 \cdot J$), we define $W = (w_1, \ldots, w_J)$ as a $(D_J \times 1)$ vector of weights for each decile of each contributing region $j$. $\overline{W} = \{ (w_1, \ldots, w_J)^T \}$ is the set of possible different combinations of $w_j$, under the conditions that $w_1 + \cdots + w_J = 1$ and $w_j \geq 0 \forall j = 1, \ldots, J$. $Z_1$ is a $(T \times 1)$ vector containing the educational outcomes for the decile under analysis, where $T$ is the number of pre-conflict time periods used. $Z_0$ is a $(T \times D_J)$ matrix which contains the same outcomes for all $J$ regions during all $T$ time periods. We then use the following method to find the outcome of $W$ that minimizes the difference between the real Basque region and the artificial one:

$$W^* = \arg\min_{W \in \overline{W}} (Z_1 - Z_0 W)^T (Z_1 - Z_0 W)$$

This method is repeated ten times for each decile to get estimations for each one. As a basis, we use the data from people born between 1930 and 1955 as the source of data for the pre-conflict births. As the conflict breaks out around 1970, this means that all individuals who reach age 15 after the initiation of the conflict are assumed to be influenced by its presence. As this choice may seem rather arbitrary, we show in the robustness checks that the results do not change significantly for other
reasonable pre- and postwar assumptions. The postwar generation, as discussed in the next section, ends with the generation born in 1976, after which there is no data available on completed educations.

**Comparison With Abadie and Gardeazabal**

Although it is clear that our method of analysis is similar to that of AG, it should also be obvious that it differs on a number of significant points. The most obvious one is the difference in terms of content. The variables analyzed in AG (GDP and stock returns) are flow variables and are as such more susceptible to rapid change, whereas the variable that we look at (education) is a stock variable and has a much lower variance. In addition to that, the variables of GDP and education level are only weakly related to each other in the short run, so one would, therefore, expect the type of analysis, as well as the results, to be different in any case. Second, the analysis differs because AG consider only one value per region-year, which makes sense for a measure like GDP, whereas we are particularly interested in the different effects happening in different places within the entire distribution of education.

Third, an important differentiation between AG’s analysis and our own is that AG do not replicate the time series of Basque GDP, but instead replicate the underlying fundamentals. Unfortunately, in the case of education, particularly when wanting to consider the distributional effects, it is not possible to use such an estimation technique, because it is not clear what the underlying fundamentals of education are (apart from a number of elements that cannot distinguish between different elements of the distribution). Therefore, in our analysis, we ex ante separate the few available fundamentals, such as time trends, from the data.

Clearly, the differences between the AG analysis and our own are so large that it is not useful, or feasible, to compare the results from our respective analyses. However, to increase comparability somewhat, we estimate what the results are when using the educational averages, instead of the distribution. The results from this comparison are found in subsection on Robustness.

**Data**

In this section, we give a description of our data sources and a description of what is done to make them suitable for this analysis. The dependent variable is the accomplished education level, which runs, as said before, from 1 to 10. Like all the individual data, these data come from the National Censuses in 1991 and 2001 (Instituto Nacional de Estadística 1991, 2001). Unfortunately, the two Censuses use different definitions of the Education system, but using information from the Ministry of Education (retrieved from http://www.mec.es), we can transform the fifteen categories in the 1991 Census to conform to the ten categories in the 2001 Census. The 1991 Census used a 10 percent sample of the population, yielding a total of 3,888,692 observations and the 2001 Census interviewed...
2,039,274 individuals, giving us a total of 5,927,966 observations. However, we drop those individuals who are born abroad or in either Ceuta or Melilla, the two small city regions on the North African coast and retain 5,714,097 individuals. The next step is dropping the individuals who may not yet have completed their entire education. Assuming that the maximum level of education is in principle reached at the age of 25, we drop all observations aged less than 25 at the time of their Census interview, thus retaining 3,842,997 observations. As can be seen in the results section, we experiment with the starting date for the analysis and drop more observations that way, but in principle we can use nearly 4 million observations.

From the Census, we also retrieve the gender, the birth year, and the birth province upon which the provincial dummies are based. Next up is provincial population density, which proxies the availability of primary and secondary education. These data are also retrieved from the Instituto Nacional de Estadística’s Census results (2008). Goerlich Gisbert and Mas Ivars (2001) are the source for the 1967 GDP data.

The final variable in the first-stage ordered probit regression is the dummy for whether there is an institution of Higher Learning in the Province of birth. To create this variable, we obtained a list of current institutions of Higher Learning from the Ministry of Education. We then performed a Web-based research on all the individual institutions and set up a database on their respective histories. This database includes the founding dates of each of the institutions, and whether they are follow-ups of other institutions. If they are, we then looked up the founding dates of the previous institutions. For most institutions, this method worked very well and for those few for which it did not, we contacted the institutions directly to obtain the required data. Overall, this yielded a database with an observation for each province-year and whether an institution of higher learning was present.

Results

As explained in the previous section, we start with a first-stage regression that aims to take out the most obvious effects that influence the level of education. The results of this regression, following Equation 15, are shown in Table 1. The different columns all use different sample periods, which is going to be useful at the next stage when it has to be determined which time period is most appropriate. It can already be seen that the differences in the coefficients between different periods is relatively small, so the sample selection is not expected to have a strong influence.

A disadvantage of using ordered probit analysis is the difficulty in interpreting the coefficients. Therefore, for ease of interpretation, an ordinary least squares (OLS) regression is added in Table 1, of which the coefficients do not necessarily convey much meaning, but the signs of the coefficients do. Unsurprisingly, gender has a positive effect (with men given the value 1 for this dummy variable) and the year of birth does as well. As expected, richer regions also have higher levels of education. The effect of population density, however, has an effect opposite to what might be expected. After all, it was hypothesized that an increase in density should be
associated with easier access to schools and therefore an increase in education. It turns out that this effect actually goes in the opposite direction and an increase in population density is in fact associated with a lower level of education. One possible explanation for this result is that when the higher population density is the result of higher population growth, this may be correlated with high fertility rates or a quickly increasing tutor–pupil ratio when the education authorities’ reaction time is relatively slow.

Following Equation 16, we calculate the residuals of the level of education and end up with our variable referred to as “residual education,” with which we continue to go on to the second stage of our analysis. At this second stage, we use Equation 17 to determine the values for the artificial region.\(^9\) The different components that make up the artificial Basque Region are shown in the appendix available online. Our artificial region is composed of very different elements to those found in AG, whose artificial region consists of only Catalonia and Madrid. For our results, however, all regions, except the Balearic Islands, contribute to the behavior of the synthetic Basque region. For conciseness, we have summarized the data, and we show for the artificial low, medium and high levels of education what the contributing regions are.

As for the contributing deciles, the table shows whether the contributing decile is equal to the contributed decile (same), whether it is from one of the lower deciles (lower) or whether it is from a higher decile (higher). The final column shows the contribution of all contributing elements to all deciles. For example, when creating the lowest three deciles, 54.2 percent of the contributions come from same-level deciles in other regions and particularly Madrid and Navarra play a large role. At the same time, 33.2 percent of the contributions to the lowest deciles come from higher

---

### Table 1. Results from the First-Stage Ordered Probit Regression

<table>
<thead>
<tr>
<th></th>
<th>All_Data</th>
<th>&gt;1909</th>
<th>&gt;1929</th>
<th>&gt;1934</th>
<th>OLS, &gt;1909</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.163***</td>
<td>0.160***</td>
<td>0.127***</td>
<td>0.108***</td>
<td>0.208***</td>
</tr>
<tr>
<td>Birth year</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
</tr>
<tr>
<td>ln(gdp(_{1967}))</td>
<td>1.500***</td>
<td>1.504***</td>
<td>1.536***</td>
<td>1.503***</td>
<td>2.022***</td>
</tr>
<tr>
<td>ln(popdens)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>ln(poppdens)</td>
<td>-0.284***</td>
<td>-0.317***</td>
<td>-0.484***</td>
<td>-0.483***</td>
<td>-0.101***</td>
</tr>
<tr>
<td>ln(popdens)</td>
<td>0.004</td>
<td>0.005</td>
<td>0.006</td>
<td>0.006</td>
<td>0.008</td>
</tr>
<tr>
<td>ln(poppdens)</td>
<td>0.051***</td>
<td>0.041***</td>
<td>0.020***</td>
<td>0.034***</td>
<td>0.128***</td>
</tr>
<tr>
<td>ln(poppdens)</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
<td>0.004</td>
</tr>
<tr>
<td>Prov-dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>(N)</td>
<td>3,834,854</td>
<td>3,736,709</td>
<td>2,958,818</td>
<td>2,640,918</td>
<td>3,736,709</td>
</tr>
<tr>
<td>LR—(\chi^2)</td>
<td>1,620,372.7</td>
<td>1,519,346.1</td>
<td>922,046.3</td>
<td>684,278.3</td>
<td>-</td>
</tr>
<tr>
<td>(df)</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

Note: OLS = ordinary least squares. The results of the first-stage regression show the values of some of the most obvious explanatory variables that are able to explain long-run education achievements. The table shows coefficients and standard errors and *** implies a significance level of more than 99 percent.
ranked deciles (Cantabria and Navarra, in particular), whereas 12.6 percent come from lower ranked deciles. Of course, this is only a summary measure and the more detailed information could be interesting too. The contributors can be quite surprising in fact. For example, for the recreation of the fifth decile, the contributors are as follows: Navarra decile 1 (13.7 percent), Cantabria dec.3 (1.9 percent), Galicia dec.3 (18.1 percent), Navarra dec.3 (10.2 percent), Canary Islands dec.4 (8.2 percent), Catalunya dec.5 (26.3 percent), Cantabria dec.6 (4.3 percent), Aragon dec.6 (9.6 percent), La Rioja dec.6 (5.9 percent), and Madrid dec.10 (1.9 percent). For all deciles together, the greatest contributors are Navarra with 28.9 percent, Madrid with 14.0 percent, and Asturias with 9.4 percent.

The question remains whether these results reflect reality well. This can be shown graphically, by showing the graphs that compare the true Basque region with the artificial one. Figures 2–4 show the residual education values for the low, middle, and high deciles of the true and artificial Basque Regions. For the lowest deciles, it can clearly be seen from the graph that there is a disparity between the true Basque region and the artificial region, but it also shows that this divergence starts before the conflict generation is born. In fact, for those born after 1955, the disparity is not any larger than for those born before 1955. For the highest deciles (Figure 4), there is also no division at all between the pre-conflict generation and the post-conflict generation. However, when looking at the middle levels of education in Figure 3, a clear divergence takes place. As we hypothesized in the section on Theoretical Model, the level of education for this group of individuals actually increases compared to the artificial Basque Region. This is compatible with what we stated earlier, if indeed a larger portion of these individuals decides to seek opportunities outside the Basque

![Figure 2](image-url)
Region. A quantification is possible, with the total divergence between the true and artificial Basque Regions being approximately 0.5 points of residual education. To put this value in perspective, we have calculated the average difference between any two contiguous deciles, which turns out to be approximately 0.6. Therefore, the relative increase in education is nearly equal to an upward movement of one decile for the entire middle population, which is a surprisingly large result.

Robustness

One of the interesting features of the methodology we use is the possibility of looking at what the different effects are in different locations in the distribution. However, this also means that we had to significantly alter the methodology used by AG, and one may wonder what happens when one looks at averages instead. For that reason, we reestimated our results using only regional averages, thus having only 15 potential contributors (the other regions) to the artificial region. In this result, only two regions contribute to the artificial region: Catalunya with 73 percent and Cantabria with 27 percent. As for the results, they confirm our expectations with a slight increase in the level of residual education in the true region compared to the artificial region. Although this is an interesting result in itself, we think the different effects taking place in different places in the educational distribution is actually more interesting.

The further robustness check is a placebo study that performs the same analysis as the one with the Basque Region but uses a different region instead (as done by AG as well). When performing the analysis on Catalunya, the artificial region again

Figure 3. This figure contains the values of residual education for the true Basque and the artificial Basque regions for the four middle deciles.
consists of a range of contributing regions. To avoid endogeneity, we exclude the Basque Region from potentially contributing, but nearly all other regions do contribute somewhat. The largest contributions come from Asturias, Madrid, and La Rioja. The appendix available online contains a figure with the differences between the education in true and artificial Catalunya for lowest, middle, and highest deciles. Although the fit before the start of the conflict is obviously greater, there is no clear trend for any of the education groups after the conflict start. This is clear support for our theory that the effect we find in the Basque Region is not merely accidental.

Additional Evidence

Our results in the previous section indicate that in the Basque Region, the middle deciles increased their levels of education disproportionally compared to individuals who did not reside in the conflict region. In the section on Theoretical Model, we hypothesized that this is due to the increased incentives to migrate. Of course there may be other channels through which the changes in educational achievements change, but since we have no alternative theories available, it makes sense to test the migration theory. We do this by looking at the actual migration behavior of individuals. Here we use a relatively straightforward technique and simply consider the diff-in-diff for within-country migration from the Basque Region and from all non-Basque regions. As is shown in the top part of Table 2, both before and after the conflict, Basque-born individuals are less likely to migrate to other Spanish regions than individuals born elsewhere in Spain. This may be due to the cultural difference between the Basque Region and the other regions, but it may also be due to the superior economic position held by the Basque Region. Table 2, however, also
shows that there is quite a large decrease in the probability of migration for non-Basque individuals after the cutoff point. The Basque-born individuals, however, actually become slightly more likely to migrate. This implies that, according to our difference-in-difference estimation, the Basque-born indeed increase their probability of within-country migration.

Another important implication of the theoretical model is a (relative) decrease in the level of education of migrants. After all, the education cutoff beyond which individuals decide to migrate moves to a lower part of the distribution and as a result, the average migrant’s level of education should go down. Considering the difference-in-difference, the lowest section of Table 2 shows that the level of education of migrants from the Basque Region indeed decreases, compared to migrants from other regions. However, in contrast, the middle section of the table shows that the overall education level of Basque-born individuals increases faster than that of non-Basque born ones, despite the fact that the Basque-born have a higher level of education to start with. Again, this is evidence that supports our theory that the occurrence of conflict increases the incentive to migrate and that the potentiality of migration requires a higher level of education.

Three things should, however, be considered in this case as well. The first is the geographical size of the regions. After all, their sizes differ immensely and it can be expected that fewer people from large regions migrate than people from geographically smaller ones. This cannot be driving the effect we find for two reasons. First, the Basque Region is in fact among the smallest of the regions and one should, therefore, in principle expect a higher level of migration, which is not the case. Second, as

| Table 2. Naive Diff-in-Diff Estimation of Effects of Civil Conflict on Migration and Education Levels |
|---|---|---|
| | Spain | Basque | Difference |
| %Migrants | 30.5 | 15.1 | 15.4*** |
| Pre-conflict | 25.2 | 15.4 | 9.8*** |
| Post-conflict | -5.3*** | 0.3*** | 5.6*** |
| Difference | N = 3,995,162 |
| Educ-all | 3.09 | 3.85 | 0.77*** |
| Pre-conflict | 4.79 | 5.69 | 0.90*** |
| Post-conflict | 1.70*** | 1.83*** | 0.13*** |
| Difference | N = 3,986,468 |
| Educ_migr | 3.33 | 4.42 | 1.09*** |
| Pre-conflict | 4.82 | 5.76 | 0.94 |
| Post-conflict | 1.49*** | 1.34*** | 0.15*** |
| Difference | N = 1,093,197 |
| Note: This table shows a naive difference-in-difference comparison between the Basque region and the rest of Spain, in which it can be seen that migration out of the Basque Region has increased, that the average education level has increased, and that the average migrant’s education level has decreased. Within parentheses, the standard deviations of the diff-in-diff estimations are included. *** implies a significance level of more than 99 percent. |
the sizes of the regions do not change over time, this cannot be expected to influence the results from our difference-in-difference analysis.

The second thing that needs to be considered is foreign migration. As we use data from the Spanish Census, this merely includes data regarding those individuals who are still living in Spain. The percentage of Spaniards migrating internationally has been relatively small (compared to within-country migration) and would not be able to explain our results. However, even if there were a relatively large amount of international migration, this would have only two effects: First, it would increase the amount of migration, particularly from the Basque Region, as it is close to the international border with France. Second, with the increasing integration between Spain and the rest of Europe, including their joining of the European Union, one would particularly expect the later period to have increased total migration, because of the international component. This would imply that the result we find now is in fact an underestimation of migration effect rather than an overestimation.

Finally, the third factor that further strengthens our results is government policy. For political reasons, successive Spanish governments have been trying to give incentives to individuals to move toward the Basque region. This would imply that, overall, within-country migration has been stimulated more in the non-Basque regions than in the Basque Region itself, which again biases our results in the direction of an underestimation rather than an overestimation.

**Conclusion**

In this article, we analyze the potential effect that conflict has on the incentives to acquire education. According to our naive theoretical model, the demand-side effects of civil conflict particularly influence the middle levels of education, although this depends on the parameters of the model. We test our theoretical model in an analysis of the Basque conflict region in Spain. After all, this is exactly the kind of conflict in which our theoretical model is applicable, because it is a conflict that is relatively low-key and influences only the demand for education and not the supply thereof. After all, at no time during the conflict, was there any significant interruption of the supply of education, which makes it an interesting case to analyze. When using a relatively advanced matching technique to set up an artificial region that has an educational distribution similar to that of the Basque Region, it turns out that the effects are indeed particularly visible among the median levels of education. These individuals, it turns out, acquire a significantly higher level of education after the initiation of the conflict than beforehand, which leads us to believe that there, in fact, exists a causal relationship. The probability of migration of this group also increases over time, which is in concordance with our results.

The results found in this article contrast previous findings in which conflict has been shown to have a negative impact on human capital accumulation. We argue that this negative relationship is indeed true but fully due to supply-side effects, whereas demand-side effects actually increase human capital accumulation. As a result, the
supply-side effect found in previous articles is probably an underestimation of the true effect.

Although it is a little difficult to see usable policy recommendations on basis of our results, we do believe there is scope for some. One of the major differences between the conflict in the Basque Region and many other civil conflicts is its geopolitically limited scope. The conflict is limited to the Basque Region only, and the rest of the same political entity (i.e., Spain) is unaffected. Apart from potential cultural—linguistic barriers, there are no barriers to migration between the Basque Region and the rest of Spain, which makes sure that, even when individuals expect only a modest utility improvement from migrating, they still increase their demand for education. In many other conflicts, momentarily ignoring the supply-side effects, civil conflict in one country may in fact increase the difficulty of migration to other places, when a conflict engulfs an entire nation. And this is where we can suggest one potential policy recommendation, because it is clear that when individuals have the option of migration in the future, like in the rest of the brain gain literature, this improves their incentives for education. It is therefore not wise to lock refugees/migrants into positions where there is little scope for improvement, because in the long run, this strongly reduces their incentives for education, which exacerbates the long-run negative impact of conflict.

Authors’ Note

Olaf J. de Groot is affiliated with the German Institute for Economic Research (DIW Berlin), although most of the research took place when affiliated with Bocconi University, Milan, Italy.

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Notes

2. This subsection including the description of the Basque conflict leans heavily on the description in AG.
3. This assumption is merely in place to avoid an outcome in which the entire population decides to migrate, which is unrealistic and undesirable.

4. For practical purposes, we assume there is no unemployment and that every individual is able to find the job that he or she wants. The effect of this assumption is the same as an implicit assumption that for equal individuals, there are equal opportunities in the home and migration regions. This is in contrast to most of the existing employment literature, which focuses on labor demand, whereas we only consider labor supply.

5. Remember that we said that only a portion $\gamma$ of the population is potentially interested. This is to make sure that there is no situation in which the entire population chooses to migrate.

6. As explained at a later stage, the provinces of Ceuta and Melilla are dropped due to their specific status.

7. This is an ordinal variable, which is why we use the ordered probit methodology. The situation would be different if the education level were, for example, measured in total years of schooling. The total number of levels is ten.

8. More particularly, the categories “Formacion Professional 2° grado, Maestria Industria” and “Otras titulaciones media” were combined to become “FP Grado Superior”, “Arquitecto e Ingeniero Tecnico y Diplomado (aprovado completo 3er curso) de Escuelas Tecnicas Superiores”, “Diplomado de Escuelas Universitarias y Diplomado (aprobado completo 3er curso) de Facultades y Colegios Universitarios”, “Arquitecto o Ingeniero Superior” and “Titulaciones deEstudios Superiores no universitarios” form “Diplomatura” and finally, “Titulaciones de Estudios de Posgrado o Especializacion para Licenciados” is added to the category of “Doctorado.”

9. As expected, given the size of our sample, using the ordinary least squares (OLS) results instead of the results from the ordered probit analysis yields the same residual levels of education.

10. Of course, for the first decile, there are no lower ranked deciles, so a specific value for the first deciles has to be 0. The contributions of Castile & Leon, Madrid, and Navarra take place in the estimation of the second and third deciles.

11. For brevity’s sake, we do not include graphs for each separate decile, but they are available from the authors.

References


