ISSN 1471-0498

DEPARTMENT OF ECONOMICS

DISCUSSION PAPER SERIES

BRAIN DRAIN OR BRAIN GAIN?
MICRO EVIDENCE FROM AN AFRICAN SUCCESS STORY

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Number 343

August 2007

Manor Road Building, Oxford OX1 3UQ

Brain Drain or Brain Gain?
Micro Evidence from an African Success Story[1]

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This Draft: August 10, 2007.

Abstract

Does emigration really drain human capital accumulation in origin countries? This paper explores a unique household survey designed and conducted to answer this specific question for the case of Cape Verde - the sub-Saharan African country with the largest fraction of tertiary-educated population living abroad, despite also having a fast-growing stock of human capital. Unlike previous literature, the ideal characteristics of our tailored survey allow us to explicitly test "brain gain" arguments according to which the possibility of own future emigration positively contributes to educational attainment in the origin country. In particular, we introduce a new method to estimate this effect by using full histories of current and return migrants (which enable controlling for migrant selection on unobservables), and a new set of exclusion restrictions both at the regional and household levels. Our results are robust to the inclusion of controls for remittances, family disruption, and general equilibrium effects of emigration. In constructing a counterfactual distribution of skills to answer our research question, we combine the survey data with information from censuses of the destination countries to account for the characteristics of the labour force that is (permanent and temporarily) lost due to emigration. Our results point to commonly used "brain drain" figures to be significantly exaggerated, whereas there may be substantial "brain gains" from allowing free migration and encouraging return migration.

JEL Codes: F22, J24, O15, O55

Keywords: brain drain, brain gain, international migration, human capital, effects of emigration in origin countries, household survey, Cape Verde, sub-Saharan Africa.

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[1] We would like to thank Pierre-Richard Agénor, Randall Akee, Catalina Amuedo-Dorantes, Raquel Carrasco, Marcel Fafchamps, Timothy Hatton, Rocco Macchiavello, Marco Manacorda, Silvio Rendon, Francis Teal, Robert Willis and Adrian Wood for helpful comments and suggestions. We are indebted to Paul Collier for providing initial encouragement for this research project. We are also grateful to seminar participants at Oxford, Manchester, Bank of Spain and at the Oxford CSAE 2007, IZA/World Bank/IZA 2007, and Chicago ESPE 2007 conferences and SOLE/IZA Transatlantic Meeting 2007. We acknowledge financial support from the ESRC-funded Global Poverty Research Programme (GPRG) for the tailored household survey conducted in Cape Verde on which this paper is based. We are indebted to the dedicated team of local enumerators with whom we worked, and to Deolinda Reis and Francisco Rodrigues at the National Statistics Office of Cape Verde. Research assistance was provided by Mauro Caselli, under the financial support of the George Webb Medley Fund at the Department of Economics of the University of Oxford.
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Table of Contents

1. Introduction 3
2. Cape Verde: A short introduction to the country 5
3. Data Sources: Tailored Household Survey Design, Some Descriptive Statistics, and Other Sources 6
4. Impact of emigration on the educational attainment of those who leave the country 8
   4.1. Educational attainment of emigrants who are residing abroad 9
   4.2. Educational attainment of returning emigrants 12
5. Effects of emigration on the educational attainment of those left behind 13
   5.1. Impact of household emigration on educational attainment 15
   5.2. Impact of probability of own future migration and of other migration channels on educational attainment 17
   5.3. Counterfactual education of those who do not emigrate 21
6. Some counterfactual numbers on the "brain drain" vs. "brain gain" controversy 22
7. Concluding Remarks 23
8. References 24

Appendix 1: Growth Accounting 27
Appendix 2: Classification of Educational Attainment 29
Figures 31
Tables 34

1. Introduction

International migration has been increasing in the last decades and with it the importance of phenomena like the "brain drain" or international remittances. These issues are currently under the spotlight (World Bank 2006a, 2006b), and yet most questions regarding its quantitative relevance for human capital accumulation or economic growth performance of origin countries remain unanswered.

This paper aims exactly at empirically evaluating the causal link between emigration and human capital accumulation. We focus on the case of Cape Verde, which has been recently presented by the World Bank (2006a) as the African country with the largest fraction of educated population living abroad. Cape Verde has, however, displayed substantial numbers for the growth of human capital since 1990.[5] These two apparently contradictory facts suggest that there may be more to the emigration/human capital relationship than is suggested by traditional "brain drain" theories. This motivates our examination of whether emigration really drains human capital accumulation in origin countries.

Traditionally, international emigration of the most educated has been associated with multiple potential problems. These have generally been labelled "brain drain": the loss of the brightest national citizens, implying the disappearance of a critical mass in production, research, public services (notably health and education) and political institutions.[6] This effect may be even larger than its direct impact due to the externalities brought about by interaction of the most educated, or due to complementarities with factors of production such as capital equipment or total factor productivity (TFP), which are likely to magnify the productive contribution of skilled workers.[7] Moreover, massive emigration of the most educated is likely to imply significant fiscal losses due to foregone tax revenue (an otherwise likely counterpart to investment in the education of the emigrated workers).

In recent years, the economic literature has also focused on the potential gains of emigration. Countering the traditional brain drain literature, the arguments for "brain gain" propose that an increase in expected returns to education generated by the possibility of emigration may prompt a

[5] As is shown in Appendix A, over the period 1990-2005, the stock of human capital in Cape Verde grew at an annual rate of 3.5%. In addition, according to our growth accounting results, human capital accumulation is the aggregate input most strongly related to the excellent growth performance of the Cape Verdean economy over those 15 years.

[6] The traditional brain drain literature was notably developed by Gruber and Scott (1966) and Bhagwati and Hamada (1974).

[7] The external effect of human capital on production was first modelled by Lucas (1988), and further discussed by Borjas et al. (1992) and Acemoglu (1996). Complementarities in aggregate production are discussed and empirically evaluated by Stokey (1996) and Krusell et al. (2000), respectively, among others.

net increase in the rate of human capital accumulation.[8] This would imply that an increase in the own probability of migration may accelerate human capital accumulation as long as destination countries have a higher return to education than origin countries, or education lowers the cost of migration, making it easier to enter another country with higher real wages. Moreover, emigration might have an indirect positive effect on education via remittances. The importance of international remittances has been emphasized by Ratha (2003) among others, basically on the grounds that these reduce financial constraints in receiving countries that may increase the probability of getting a degree.[9] Return migrants may also be beneficial to their home country as they bring with them not only financial savings, but also a set of newly acquired productive skills that positively contribute to a country's stock of human capital.[10]

In this paper we take a restricted perspective of the "brain drain" vs. "brain gain" debate: we focus only on measuring the educational losses and gains caused by emigration to its origin country. This narrow focus should allow us to provide precise, quantitative answers to the question at stake, while considering a variety of channels. For this specific purpose, we designed and conducted a household survey, for which 1066 households living in Cape Verde were interviewed face-to-face. This tailored survey provides us with full histories of current and return migrants, as well as a rich set of variables not only on migration, but also on political and psychological perceptions, both at the household and at the regional levels.

In order to achieve our final goal of constructing a counterfactual distribution of skills in Cape Verde had there not been emigration or had all current emigrants been forced to return, we cannot simply add emigrants to the education distribution of residents in Cape Verde. We would be assuming that individuals make the same educational choices with or without the option of emigration. In reality, the education of permanent emigrants, return migrants and non-migrants is likely to be affected by their option to emigrate.

Under these lines, our work starts by defining and calculating a realistic measure of the brain drain, estimating the counterfactual distribution of education of current emigrants and returning migrants had they not migrated. Indeed, a fraction of the educated emigrants is observed after having upgraded their schooling achievement abroad. In order to compute the actual "brain drain" we need to know the level of schooling that the migrant population would have had if they had not migrated, which we estimate.

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[8] Miyagiwa (1991), Mountford (1997) and Stark et al. (1997, 1998) were the main proponents of the brain gain hypothesis. Beine et al. (2001, 2003) present supporting empirical evidence at the macro level.

[9] Evidence of the positive effects of remittances on education and investment is provided, among others, by Edwards and Ureta (2003) for El Salvador, Yang (2006) for the Philippines and Mishra (2006) for 13 Caribbean countries.

[10] See Dustmann and Kirchkamp (2003) and Mesnard and Ravallion (2006) on this topic.

We then turn to explicitly test "brain gain" arguments according to which the possibility of own future emigration positively contributes to educational attainment in the origin country. In particular, we propose a new method to estimate this effect by making use of full histories of current and return migrants, which allow controlling for migrant selection on unobservables. Our results are robust to the inclusion of controls for other potential channels of effects from emigration to educational attainment, such as remittances, family disruption, and general equilibrium (at the local level) effects of emigration, which do not seem to be as relevant as previous literature would suggest.

The remainder of the paper is organized as follows. In the next section, we begin by presenting a brief overview of the main characteristics of Cape Verde. We then proceed by presenting the household survey we use in our empirical work, including its most interesting descriptive statistics. In section 4, we define and propose a realistic measure of the "brain drain" in Cape Verde. In the following section, we empirically establish the reverse "brain gain" forces, by estimating the impact of the probability of own future emigration on educational achievement of non-migrants. In section 6, a counterfactual skill distribution is presented for the scenarios in which all current emigrants return to the origin country and in which all emigration is forbidden. Section 7 summarizes and presents policy implications.

2. Cape Verde: A short introduction to the country

Cape Verde is a nine-island country with 441,000 inhabitants, according to the latest 2000 census. It became independent from Portugal in 1975 and has been a stable democracy since 1991. The country is currently ranked by the World Bank as a "*Lower Middle-Income*" economy, and had a GDP per capita of 5900 PPP-Adjusted Dollars in 2003, according to Heston et al. (2006).

Cape Verdean economic growth clearly exceeded the Sub-Saharan African average of 0.6% GDP per capita growth over 1980-2004, according to Heston et al. (2006). Indeed, it was the third fastest country in terms of per capita growth out of the 45 sub-Saharan countries in Heston et al. (2006), after Equatorial Guinea (11% average annual growth rate) and Botswana (5%), both countries rich in natural resources and with exports accounting for a large fraction of their GDP (47% and 55%, respectively). Unlike these countries, Cape Verde stands out growing at an average annual rate of 4.4% (4.1% over 1981-1990, 5.8% over 1991-2000) but with exports accounting for only 20% of its GDP and no natural resource abundance - rather the opposite, as droughts and famines were recurrent in the country's history.

Droughts and famines indeed prompted the massive emigration phenomenon that has characterized this country for many decades. According to our estimates (based on census data for the stock of immigrants in most destination countries[11], adjusted for a conservative 10% probability of underreporting of illegal immigrants), there are about 84,467 Cape Verdean current emigrants, or about 18% of the population. Moreover, Docquier and Marfouk (2006) estimated at 67.5%, the percentage of the educated labor force of Cape Verde lives abroad - the largest such number in the African continent. In addition, the magnitude of international remittances received in Cape Verde is impressive: as shown in figure 1, these flows account for 16% of GDP on average over 1987-2003 (WDI, 2006), according to official numbers, likely underestimated as they do not include informal channels. These numbers are again the largest in Africa and translate the especially important role of remittances for the country, particularly given the relative magnitude when compared to aid and foreign direct investment inflows.

A final note is deserved by the educational system in Cape Verde, which potentially provides the supply side restrictions to our question of interest. This is remarkably good, particularly for sub-Saharan standards, at least until the university level. Primary (6 years of schooling) and secondary schooling (six further years) are widely available at the local level (there is at least one secondary school per municipality, even more so at the primary level). Higher education institutions only started working in the country in 1995 and are located in the capital island.

3. Data Sources: Tailored Household Survey Design, Some Descriptive Statistics, and Other Sources

3.1. Household Survey Design and Conduction

Our empirical work is based upon a household survey on migration and the quality of public services purposely designed to answer our questions, which was conducted in Cape Verde from December 2005 to March 2006.

The tailored data collection consisted of survey (face-to-face) interviews conducted by teams of local interviewers and one of the authors. He recruited and trained the local teams making sure that each interviewer had at least a total of 18 hours of training in groups of 2-3 individuals. Training included lectures on the content/objectives of the survey; answering the questionnaire; and piloting (at least once per interviewer).

[11] The destination countries we consider are: Portugal, United States, France, Netherlands, Luxembourg, Italy and Spain.

The survey questionnaire was submitted to 1066 households (997 complete interviews) in 30 (or 5%) of the 561 census areas of CV. It was composed of two modules: one on perceived quality/corruption of public services; and the other on migration characteristics of the household.

The sampling process was such that sampled census areas were chosen randomly weighting by the number of households, and households within a census area were chosen randomly using standard techniques (10^{th} house, with second visits tried in the same day). The requirement condition for a household to be interviewed was family residence in the country anytime in 1985-2006. The requirement condition for a respondent within a household to be interviewed was to be aged 30 or more years old.

There are two imperfections to the random sampling of households in the survey. One is differences in attempted interviews in the different census areas, and the other is non-responses. We use weighted data to account for these problems (although differences to unweighted data are negligible) for which data collected from non-respondents are exploited (gender, approximate age, approximate schooling, and approximate income).

3.2. Descriptive Statistics

In this section we briefly characterize the information from our household survey emphasizing the comparability of our data with those of other sources.

In terms of basic demographics, our survey seems to reflect well the structure of the population of CV in terms of gender, age and education. We compare the big picture coming from our survey with the last census from INE (2000) and other information provided by the World Bank (WDI, 2005). Tables 1 and 2 show that there are no significant differences between our numbers and those provided by the WDI (2005) and INE (2000).

In terms of labor situation there are some differences. Table 3 points to participation rates (active population relative to population aged 15 to 64) being fairly similar to those coming from INE (2000) and WDI (2005) when a strict definition of activity is used. However, unemployment rates are higher compared to both the INE (2000) and Observatory of Unemployment (2005) (even when a broad definition of unemployment is used). It is likely the case that some people who report to be unemployed are in fact working in the informal sector, which accounts for a significant fraction of the country's economic activity.

As can be seen from Table 4, the figures for migration flows reflect fairly well the percentages that are found in the INE (2000) census for the period 1995-2000. However, the stock of migrants

abroad that comes out of the survey is smaller, according to our estimates.[12] This mismatch reflects the fact that many whole and reunited families are abroad and they cannot, by design, be accounted in the surveyed sample.

To characterize those migrants that we miss to capture in our survey, we compare the information in the survey with the information coming from the censuses of three important destinations (as shown in table 5): Portugal, USA and France. The results are presented in table 6.

3.3. Additional Data Sources

In summary, our survey seems to accurately depict migration reality in Cape Verde. However, it misses some emigrants (mostly those who did not leave family behind (the most educated and better off). In order to correct for the (observable) selection bias induced by this absence, we use census data from the destination countries on Cape Verdean immigrants. This information allows us not only to estimate the stock of emigrants abroad, but also to control for the observable characteristics of emigrants, such as age and education, as presented in the previous section.

An additional weakness of our survey is that it has a relatively small sample size for some of our analysis purposes. In order to mitigate this problem, we complement our survey with the use of a household budget survey to estimate crucial parameters and variables of interest, such as household expenditure and the rate of return to education. This Income and Expenditure Household Survey was designed and conducted by the National Statistics Office (INE) in 2002-2003, under the sponsorship of the World Bank.

At different stages of our project, we also make use of various sources of data, namely the 1990 and 2000 Census of Cape Verde, as well as additional National Accounts, Demographic and Labor Market Data from INE.

4. Impact of emigration on the educational attainment of those who leave the country

Emigration has a direct impact on the educational attainment of the Cape Verdean population through the loss of a selected group of individuals – this loss may be narrowly defined as a "brain drain". Moreover, those individuals who finally emigrate may upgrade their skills abroad. It is likely, for instance, that individuals who emigrate as children get an education very different to the one that they would have obtained if they had stayed in Cape Verde. We also know that a non trivial fraction of the emigrant population will not stay abroad forever and there will be a selected

[12] These are based on data from international census from ILO (2005), to which a conservative 10% margin for illegal underreporting was added.

group of people who will come back while still in the labour force, possibly bringing new skills that could be valuable in the Cape Verdean labour market – this entails the possibility of a "brain gain" through return migration.

For the above mentioned reasons, it will be useful to take into account the effect of emigration on the educational attainment of two main groups: emigrants who are residing abroad and returning migrants who are already residing in Cape Verde.

4.1. Educational attainment of emigrants who are residing abroad

We begin by analysing the educational attainment of residents in Cape Verde and of emigrants who are living abroad, which is displayed in the first three columns of table 6. [13] We can see that almost 60% of residents do not complete the 1st cycle of secondary, and only a very small percentage (around 3%) obtains a university degree. Regarding emigrants, the pattern of selection relative to the resident population is different depending on the source used to study emigration. Namely, our survey displays a much larger fraction of emigrants with higher education than the censuses of destination countries. This is probably due to the fact that the survey only has information on emigrants who have family in Cape Verde, which implies missing information about complete household emigration, thereby increasing the relative weight of those individuals who emigrated alone with the purpose of pursuing higher education. The information coming from the censuses, however, identifies a very slight positive selection pattern: only for those who complete secondary education (12 years of schooling), there is a slightly higher proportion of emigrants relative to residents.[14]

In terms of "brain drain" (narrowly defined as the proportion of high skilled Cape Verdeans living abroad), the only existing numbers are provided by Docquier and Marfouk (2006). With our data from the destination country censuses, we can also compute a measure of "brain drain" as the probability of emigration conditional on having received at least a certain degree.[15] Our calculations are displayed in the first column of table 9. The number for the brain drain of high skilled (university degree holders) is 24%, very far away from the 60% obtained by Docquier and Marfouk (2006). Even though the loss appears to be slightly higher when considering our group of

[13] Our classification of educational outcomes is detailed in Appendix 2.
[14] As detailed in Appendix 2, Docquier and Marfouk (2006) analyze emigration selection patterns based on census data of destination countries, although only for individuals older than 25. Their numbers in terms of educational attainment are similar to ours for the lowest schooling levels. However, they define the upper level of education differently as including those who have more than 12 grades of schooling, but did not complete a university degree. This classification contrasts with numbers available for Cape Verde: educational information in the census and in our survey regards completed degrees only. This explains the difference between their reported 15% and our 2% of high skilled individuals in the Cape Verdean population. Once we take this classification issue into account, the educational histograms for residents in Cape Verde and for the emigrant population match fairly well, displaying very little evidence supportive of selection mechanisms.
[15] Additional details on how the "average emigrant" is computed using the destination country censuses are provided in Appendix 2.

secondary school graduates (which includes individuals with some college, overlapping with Docquier and Marfouk (2006)'s definition of high skilled), the low magnitude of this selection pattern could hardly explain the observed large difference in brain drain numbers. Most likely this difference is due to their source of data on educational attainment for residents in Cape Verde.[16]

Because we suspect finer patterns of emigrant selection may be hidden in the aggregate numbers just considered, we now turn to analysing emigrant selection patterns depending on their destination. Almost 75% of emigrants from Cape Verde decide either to go to Portugal (57%) or to the United States (17%). Using information on the educational attainment of emigrants to these two countries, displayed in table 6, we conclude that the observed positive selection is actually coming from the emigrants who go to the United States. Indeed, emigrants residing in Portugal do not appear to be much different than those individuals residing in Cape Verde: if anything, they seem to be less educated. Two potential explanations may be underlying this fact: either selection in the United States is much stronger than in Portugal or there is an important upgrade of degrees in the United States. As suggested by Akee (2007) for the case of Micronesia, the resulting distribution of education for emigrants is probably a combination of both mechanisms. Hence, we must disentangle which part of the educational distribution is due to selection and which part is due to human capital gains derived from residing in the United States.

Table 7 presents information on the age of entry of emigrants in the United States. A big fraction enters being under 10 years old (almost 15%) and it is likely that these individuals are going to increase their educational attainment. This fact gives us reasons to believe that educational gains after emigration to the United States may be an important factor, deserving further analysis. For this purpose, we compare the educational attainment of Cape Verdeans depending on their place of residence, given age and gender, and then relate existing differences with the age of entry of emigrants, following the above stated hypothesis.

The probability of completing secondary education in Cape Verde is given by

$$P(S \mid Gender, Age, Age\text{^}2) = F(\beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Age\text{^}2) \qquad (1)$$

After estimating this probability for Cape Verdean residents, we predict the educational attainment that an emigrant with the same characteristics would have had if she would have stayed in Cape Verde. We then compute the difference with respect to her observed educational outcome.

[16] For most developing countries, Docquier and Marfouk (2006) use Barro and Lee (2001) as their source of information on educational attainment. This is missing for Cape Verde, and the criterion indicated for these cases is to use "neighboring countries". In addition Docquier and Marfouk (2006) also consider information for more destination countries than we do. Nevertheless, we account for almost 75% of all the emigrant population.

$$Difference_i = s - \overline{P(s \mid Gender, Age.Age\text{^}2)} \tag{2}$$

Finally, we check how the identified differences interact with gender and age of entry.

$$Difference_i = \gamma_0 + \gamma_1 Gender + \sum_{k=\{1,...90\}} \gamma_k 1(Age\_mig_i = k) \tag{3}$$

This procedure is repeated for the four levels of education we consider. Figures 2-5 show the coefficients on the dummies for age of entry in each of the educational levels (once we add the constant). There are indeed differences among migrants who enter at different ages. It appears that people who arrive in the United States above 21 years old are much more likely to have at least finished the first cycle of secondary education (9 years of schooling). Actually, these differences are very similar for those who finished the first and the second cycles of secondary. On the contrary, there are not many differences in terms of people who finish university.

Apparently, the fact of arriving later in life decreases, although very slightly, positive selection. On the other hand, arriving early in life seems to increase the probability of finishing high school successfully. In particular, for those who arrive before the age of 10, even the probability of completing university increases.[17] We attribute this different pattern to the fact that migrants who enter early in their lives have a higher probability of enrolling in the American educational system.

We recognize that the differences we computed and attempt to explain as increased educational attainment in the destination country may also be attributed to positive self-selection of emigrants. Indeed, there could be differences in terms of unobserved abilities between those children who arrive early in their lives and those who arrive late. It is likely that the smartest is the father, the easiest to reunify the family abroad. However, the results are kept once we control for the education of the father in both countries.[18] [19]

The results we obtain can be used to construct a counterfactual distribution of educational attainment of emigrants who entered the United States before the age of 16. This counterfactual corresponds to the initial selection of emigrants, excluding educational upgrading. In order to do so, we impute the educational attainment of an emigrant according to the educational attainment

[17] The percentage of tertiary educated in those particular groups is 10% higher than in Cape Verde.

[18] We identify the father of particular members of the household. Although this restriction lowers the number of observations in both samples, especially in the United States, the higher probability of obtaining the high school degree is kept for those who arrive early in their lives. These results can be provided upon request.

[19] An additional issue that is missing from the previous analysis is whether selection of migrants changes over time. If recent migrants are less able than those in previous cohorts (as it is suggested by Borjas, 1995), a similar picture could arise. This is the case because given the actual age, lower ages of entry reflect the fact that a migrant entered many years ago. In future work we should try to disentangle those issues by incorporating several waves of American censuses.

of a person with similar characteristics and same age of entry. [20] The fourth column in table 8 shows the results. Taking into account educational upgrading increases the percentage of emigrants who had not finished 9th grade, and especially decreases the percentage of people who had not finished secondary school. Using this counterfactual distribution of education, we can re-calculate our measure of brain drain, as displayed in the last column of table 10. As expected, numbers for the brain drain are reduced by our counterfactual experiment. Actually, since the group that was mostly affected by the counterfactual estimation was the group of migrants having completed high school, these differences increase with education, attaining a 16% reduction for university degree holders. The final numbers for brain drain average about 23%, and decrease with the education level considered.

4.2. Educational attainment of returning emigrants

A sizeable fraction of Cape Verdean emigrants decide to return after having spent some time abroad. In our survey, 2.44% of the Cape Verdean resident population reports having lived abroad for some time. If we extrapolate this number to the population in 2000, this means that more than 10,000 inhabitants (i.e., 10% of all migrants[21]) have some international migration experience.

As shown in table 11, returning migrants are over-proportionately adult males older than 50. Their typical older age is certainly underlying the fact that they show disproportionately lower education, although the probability of completing a university degree is slightly higher for returning migrants than for non migrants. This fact, places again the question of whether returning migrants obtained their degrees abroad, and ultimately whether they would have gotten the same degree if they had stayed in Cape Verde.

Although the age of entry in the destination country for returning migrants is higher than for migrants residing abroad (table 11), more than 10% of the former emigrate before age 15 and have a median emigration spell of 7-8 years. This fact could increase the likelihood of completing studies abroad. Actually, when we compare the educational attainment before and after migration, there is a slight decrease of the percentage of people who report to have finished the first cycle of secondary, compensated by an increase in the percentage of returning migrants with a high school degree. This is shown in table 12.

In order to compute the educational attainment of returning migrants if they would not have migrated, we cannot use directly the educational attainment before migration because they might

[20] For those who entered before the age of 16 we estimate the difference with respect to the educational attainment in Cape Verde if they would have entered being 16. Afterwards we add up the educational attainment in Cape Verde for a person of his characteristics.

[21] Some migrants who arrived late in the United States, are planning to come back in the future, but did not have enough time to do it. Therefore, the 10% is a lower bound for returning migration.

have decided to continue their studies even if they would not have migrated. We use a similar technique as the one used for current emigrants in order to estimate the counterfactual educational attainment of returning migrants. Unfortunately, we do not have enough observations to do the same regressions of the difference on groups by age of entry. Instead, we are going to use the reported gain on education. Let's define the variable $g = 1$ if there is an improvement on the educational attainment while abroad. In a sense we are separating the actual selection (those who emigrate with the final educational attainment) from those who went to study abroad. Table 13 reports the results of this estimation.

From table 13 it is clear that once we control for age, returning migrants have a slightly higher probability of finishing high school and going to university even for those who do not have an improvement in education while migrating, although the difference respect to non-migrants is not significant. The improvement, as it was already seen in the raw tabulations, is especially important in high school decreasing the probability of remaining with low educational attainment.

In order to estimate the counterfactual educational attainment of returning migrants, we drop this positive gain from the educational attainment of returning migrants. The results are displayed in table 14. The results show a decrease on the percentage of high school graduates which would not have reached that level if they would have stayed at home.

In addition to educational upgrading, returning migrants might bring other skills that increase their productivity at home. The paper does not address this issue specifically since our aim is to attain a counterfactual distribution of education at home[22].

5. Effects of emigration on the educational attainment of those left behind

Emigration can affect the educational attainment of children who stay behind through a variety of channels. Having a current or a return emigrant in the family may change children's probability of themselves emigrating (because they are generally better informed[23] or because they have better access to migration networks abroad), which can change their incentives to pursue education. The educational attainment of children who have not emigrated but have a migrant in the family may also suffer as a consequence of disruptions to the family structure, although it may also potentially benefit from migration remittances to the household. In addition, there may be sizable general

[22] Some preliminary work with wage regressions in Cape Verde shows that once someone control for age and education, wages are not statistically different between returning migrants and non-migrants. This fact joined with the small observed selection in terms of education for returning migrants respect to the population as a whole is evidence that there are no important skill improvements derived from the emigration.

[23] This effect may have a positive or a negative impact on their probability of emigrating as implied by the work of McKenzie et al. (2007).

equilibrium effects on educational outcomes, particularly in countries such as Cape Verde in which there is substantial emigration. These effects may include changes in the returns to education and/or in the cost of providing education (due to the selected skill composition of emigration flows) or changes in the financial system due to massive remittance inflows, which may relieve credit constraints faced by households.

Overall, the impact of migration on non-emigrant children's educational attainment is an empirical question – the one which we explore in this section.

Our analysis begins by following the scarce existing literature on the topic (namely Hanson and Woodruff, 2003, and McKenzie and Rapoport, 2006)[24], and studying the impact on children's educational attainment of having an international emigrant in their household. These studies provide apparently contradictory results: Hanson and Woodruff (2003) report evidence of positive (heterogeneous) effects of household migration on completed years of schooling, whereas McKenzie and Rapoport (2006) find that family migration depresses educational attainment for the majority of rural Mexican children (although they find some evidence for the positive effects of remittances on financially constrained households). Even though these studies adopt different methodologies[25], their results underline that there is no consensus on the empirical effects of emigration on the educational attainment of those left behind, at least for the case of Mexico. We therefore, start, by examining this same question for the case of Cape Verde.

Despite being an important and motivating first step in this analysis, examining the overall impact of family migration on individual educational attainment as done in the previous literature is unsatisfactory in that we would like to distinguish the channels through which this effect may work. Using the ideal characteristics of our unique survey, we attempt to tackle this problem by distinguishing between different mechanisms through which family emigration may affect schooling. Namely, using the full migration histories of current migrants, we estimate the educational impact of the *own probability of future migration*. This is in line with the "brain gain" theories of Stark et al. (1997, 1998), which have never been explicitly tested to the best of our knowledge. The estimation procedure we propose to evaluate this effect is particularly interesting because it allows us to control for unobserved heterogeneity: we consider actual future migration choices, which we then take into account when estimating the schooling decision those same individuals made at an earlier date. Because other migration channels may also be at work, we

[24] Hanson and Woodruff (2003) and McKenzie and Rapoport (2006) both examine the consequences of household emigration on educational attainment of Mexican children.

[25] Both studies address simultaneity between migration and education, but Hanson and Woodruff (2003) examine the impact on years of schooling, whereas McKenzie and Rapoport (2006) use completed school grades as their dependent variable which requires the use of censored-order probit models to account for right-censoring problems. We will also use data on completed school grades, but will consider each grade separately, which (in addition to adopting appropriate age intervals) mitigates right-censoring for our variable of interest and allows us to construct our final counterfactual skill distribution.

control for family disruption variables and (potentially endogenous) remittances, as well as potential general equilibrium effects of emigration in this empirical analysis.

5.1. Impact of household emigration on educational attainment

Econometric model and identification

In this subsection we examine the overall impact on individual children's educational attainment of having an emigrant in the household. We begin by presenting a simple theoretical framework for our analysis. Broadly following the existing literature on this topic (Hanson and Woodruff, 2003, and McKenzie and Rapoport, 2006), we assume at this stage that individual education and migration decisions are simultaneously determined at the household level. To model this joint decision, let us assume the existence of the following two latent (unobservable) variables, which determine schooling and migration decisions, respectively:

$$S_i^* = \alpha_0 + \alpha_1' M_j + \alpha_2' X_i + \varepsilon_{si} \quad (4)$$

$$M_j^* = \beta_0 + \beta_1' S_i + \beta_2' Y_j + \varepsilon_{mj} \quad (5)$$

These latent variables depend on vectors of variables X_i and Y_j (which include individual, family, and locality-level characteristics of individuals i and j determining future benefits and costs of education and migration, respectively) and on additive, random error terms, ε_{si} and ε_{mj}. Given the simultaneity of this model, latent variables also depend on the actual, observable education and migration decisions. These obey the following rules:

$$S_i = 1(S_i^* \geq 0) \quad (6)$$

$$M_j = 1(M_j^* \geq 0) \quad (7)$$

According to these rules, individual child i will attain a secondary level grade ($S_i = 1$) as long as the education latent variable S_i^* is non-negative, and household member j will emigrate ($M_j = 1$) if the latent variable M_j^* is non-negative.

To identify the parameters of interest in this model (α_1 in particular), we need exclusion restrictions on X and Z. Assuming errors are normally distributed, we follow Newey (1987), and use conditional maximum likelihood estimators on our bivariate probit model.

Empirical implementation and results

The measure of educational attainment we consider in our regressions is educational attainment of a certain school grade by children in a certain age interval. This specification allows us to clearly

restrict the identified effects of migration variables: we evaluate what the effect of migration is on attaining a certain school grade by a certain age. In our baseline model we consider attainment of an intermediate secondary school grade (9 years). This is interesting because about 40% of students attain this grade and it is not compulsory, unlike primary schooling. (Complete secondary schooling would also be interesting, but only attained by a small fraction of children).

Following the standard in the literature on the determinants of educational attainment, we consider our reduced form model to be dependent upon three types of variables: (i) individual level characteristics empirically related to performance (gender, age); (ii) household level proxies for available resources (number of children, asset ownership, credit constraints), as well as for the quality of family environment (highest educational level completed by members of the household) and for perceptions of the quality of schooling (which are likely related to the expected benefits to be derived from education); and, finally, (iii) local level variables such as island, urban area or other average local variables (such as unemployment, average per capita household expenditure or the skill to unskilled labor force ratio) that may affect local returns to schooling.

As shown in table 15, we find that simply introducing a regressor for the presence of a migrant in the household does not change the magnitude and level of significance of the other regressors. The estimated coefficient is itself positive, but statistically insignificant. Because there may be a simultaneity problem as described above, we use the following exclusion restrictions: local history of migration (proxying for information and networks abroad which may reduce the costs of emigrating); confidence in Oxford University (which broadly denotes confidence in foreign organizations); optimism regarding Cape Verde's future and perceived quality of the political system (a proxy for the overall state-of-affairs in Cape Verde). Instrumenting for household migration significantly increases the magnitude and significance of the estimated positive effects. One potentially puzzling consequence is that the educational level of household member and the perceived quality of the education system lose significance under this framework. We interpret this as evidence that having a migrant in the household is much more informative about migration prospects and the relevance of education for these, which makes it more determinant in making educational decisions than simply having an educated individual at home. To further test that the effect we are identifying is that of a household level migrant, we introduce a proxy for the general equilibrium labor market effects of migration: the fraction of local population who is an educated emigrant. This proxy seems to have a negative, very significant effect on educational attainment, which may be understood as evidence of a positive externality between educated individuals in the local labor market – this interpretation is corroborated by the positive, significant sign of the ratio of educated to non-educated workers in the local labor market. Including this control, dramatically increases the magnitude and significance of the estimated positive effects of having an emigrant in the household.

5.2. Impact of probability of own future migration and of other migration channels on educational attainment

This subsection addresses the question of which channels are responsible for the positive effect of household migration on children's education empirically observed in the previous section.

Several channels have been identified in the literature. Most interestingly, a number of "brain gain" theories were advanced in the nineties[26], although, to the best of our knowledge, they have never been explicitly tested for. The common baseline assertion is that the prospect of future migration may raise expected incentives to education (because returns to school are higher for emigrants or because education decreases the costs of emigrating). When uncertainty is resolved, however, not all newly educated individuals will choose to emigrate, which may cause a net increase in the number of educated individuals relative to the situation in which there was no emigration. Having a migrant in the household may contribute to this sort of "brain gain" by reducing a child's costs of future migration through improved information and other network effects.

Alternative channels through which household migration can be argued to affect educational outcomes of children in the household are remittances received by household members and/or the disruption of family structure. Indeed, remittances may relieve financial and/or credit constraints for poorer households, and therefore positively contribute to increasing educational attainment.[27] In the opposite direction, family disruption caused by the absence of parents in their roles of models and guardians, as well as the requirement of older children to take on household responsibilities, limits potential educational achievements of children left living in the household.[28]

Econometric model and identification

We propose a novel theoretical framework to examine the impact of the probability of own future migration on children's educational attainment in the home country, which we now turn to describe. In order to do so, we must consider the sequential nature of the educational decision. More specifically, we consider the following latent variable for this decision:

$$S_i^* = \alpha_0 + \alpha_1 \Pr(M_i = 1) + \alpha_2' X_i + \varepsilon_{si} \quad (8)$$

$$S_i = 1(S_i^* \geq 0) \quad (9)$$

[26] See, for instance, Miyagiwa (1991), Mountford (1997), and Stark et al. (1997, 1998).
[27] Evidence of the positive effects of remittances on education and investment is provided, among others, by Edwards and Ureta (2003) for El Salvador, Yang (2006) for the Philippines and Mishra (2006) for 13 Caribbean countries.
[28] This hypothesis is emphasized by McKenzie and Rapoport (2006).

According to (8), child *i*'s educational attainment (S_i) depends on Pr(M_i = 1), the probability of own future migration. Because this probability is unobserved, we consider the following latent variable, underlying the decision of individual *i* to emigrate:

$$M_i^* = \beta_0 + \beta_2' Z_i + \varepsilon_{mi} \tag{10}$$

$$M_i = 1(M_i^* \geq 0) \tag{11}$$

This allows us to compute E[$M_i^* \geq 0$] to proxy for the unobserved probability. Note that this expectation is taken at the time the education decision is made. Importantly, because this estimation is made using the full life and migration histories of respondents in our survey (i.e. taking as independent variables actual characteristics of respondents at the time in which education decisions are made), this method allows us to control for unobservable heterogeneity. Nevertheless, to allow for the possibility that cov (ε_{si}, ε_{mi}) $\neq 0$ [29], we require exclusion restrictions on *Z* to identify α_1.

Empirical implementation and results

The first step in our empirical procedure is the estimation of the probability to emigrate for dependents aged 19 to 30, where dependents are defined as all children, younger brothers, nephews and grandchildren of the household head.

In this first step, we take the exclusion restrictions described above, namely local history of migration; confidence in Oxford University; optimism regarding Cape Verde's future and perceived quality of the political system. The results for this estimation are displayed in table 16. They are basically in line to what one would expect, and point to some degree of individual significance of our instruments except for perceived quality of the political system. Our choice of a probit model seems harmless in that our results are basically unchanged for other specifications.

We next proceed to a second stage in which we use characteristics of individuals at age 12 (using our full history of residents and migrants' lives and associated characteristics) to predict their probability of emigration at that age.

In a third and final stage, this probability of future emigration evaluated at age 12 is used as an independent variable in several regressions of the educational attainment of individuals aged 14 to18 (the relevant interval for completing intermediate secondary schooling, given the observed levels of class repetition). To account for this procedure, standard errors are bootstrapped. They are also clustered at the household level to allow for likely correlation among members of the same family.

[29] Arguably, earlier education decisions could play a role in determining migration decisions.

When running this set of regressions, summarized in table 17, we begin by considering the probability of future migration channel on its own. We are able to find the expected positive sign, but this coefficient is only significant at the 10% level – significance is lost if we add a quadratic term. Because there may be significant general equilibrium effects correlating with the individual probability of own future migration, we introduce our proxy for these, which results in a sizable increase in the magnitude and significance of the identified "brain gain" effect. The identified "general equilibrium effects" negative and very significant, which points to some sort of complementarily or positive externality of educated workers in the local labor force. To further test whether this may indeed be the channel through which household migration positively affects educational attainment, we add controls for family disruption and remittances. Absences of the father or mother in the household significantly disrupt educational attainment, but this only increases the magnitude of our estimated coefficient. Remittances (even when instrumented by distance to the post office and by origin of remittances) have a very small and insignificant effect on educational attainment – consistent with our results on insignificant credit-constraints in the country – which barely affects the size and significance of our estimated positive effect of the own future probability of migration on remittances.

Relative importance of exclusion restrictions

One could potentially think that the use of local history of migration as an exclusion restriction to identify the effects of the possibility of own future migration was prevented because the use of this restriction did not allow us to distinguish between these effects and those of remittances, for instance. To answer this concern, we redo our estimation procedure using only the remaining three instruments (confidence in Oxford University; optimism regarding Cape Verde's future; and perceived quality of the political system), arguably uncorrelated not only with educational attainment, but also with remittances in the household.

The results from the first and third stages of our procedure are displayed in tables (18) and (19). These show that excluding the local history of migration instrument does not greatly change results in terms of signor significance of the estimated coefficient. Magnitude, however, is somewhat increased. Remittances (instrumented or not) keep their small positive insignificant effect on educational attainment.

5.2.1. Why does the own future probability of migration matter for educational decisions?

We hypothesize that having a positive probability of migration in the future may increase educational attainment if: (i) there are higher returns to education abroad compared to Cape Verde; and/or (ii) negatively depend on the level of education of potential emigrants.

Since the possibility of emigration makes the expected return to schooling equal to a weighted average of returns at home and abroad, the option of emigrating to a country where returns to

schooling are higher should increase the incentive to get education before emigration. IN addition, following the evidence in Hanson and Chiquiar (2005), costs of emigration can also be different for different levels of education. Therefore, people may be interested in acquiring more education to achieve a higher probability of emigration in the future.

In order to test our first hypothesis, we compare information on wages from the American Census and from the Income and Expenditure Household Survey conducted by INE in 2002-2003.[30] We are interested in comparing the returns to education (defined as completing 9 years of schooling) in Cape Verde and in the United States. For this purpose, we run wage regressions controlling for gender, age, education, marital status and regional dummies.[31] However, as we have seen in section 4, there are some people who obtain the degree at home and some people that study after the arrival. Since the quality of the studies could be very different in Cape Verde and in the United States, we have to control for this issue somehow. We choose to interact the educational outcome with the age of entry. We expect that those who enter being children, will have a higher likelihood of having achieved the degree in the US.

Figure 6 shows that workers with intermediate secondary schooling in Cape Verde double the wage of individuals with less education. The actual log-difference between the two groups is 0,92. This differential is much higher than that for Cape Verdeans in United States (0,37). However, returns to education in the United States vary a lot with the age of entry. Actually, the earlier someone enters, the higher the return. Nevertheless, returns to education in the United States never overcome returns to education in Cape Verde. Therefore, the average return to education (weighted by the probability of emigration) will never be higher than the return in Cape Verde alone.

How can we then explain the observed pattern of positive selection for emigration? Likely cross-country wage differentials have not been competed away, as discussed by Batista (2007) for different countries. In this instance, the standard Roy model selection predictions basaed on second moments of the income distribution proposed by Borjas (1987) may not apply. Instead, it may be more appropriate to consider the model of Guillermina Jasso and Mark Rosenzweig, as described by Akee (2007). This model, which may be thought of as nested within the Roy model, takes first moments of the income distribution, i.e. real wage differentials across countries as determining incentives for the most educated individuals to emigrate. In thisd context skilled individuals decide to emigrate despite the lower relative returns to education abroad because of the sizable absolute real differences in wages. This makes sense especially when there is an

[30] The Portuguese census does not provide information on wages, and in other sources such as the European Household Panel, Cape Verdeans are only a small fraction of the population.
[31] The results of those regressions are available upon request.

intention to return to the origin country. Indeed, this mechanism may explain why individuals would like to invest in human capital before emigrating.

In addition, it may be that the costs of emigrating are indeed lower (especially true of language barriers, for instance) for more educated individuals. But empirical support or a formal test for this hypothesis is not easy to provide.

5.3. Counterfactual education of those who do not emigrate

The previous sub-section shows that the ex-ante probability of own emigration has a positive impact on the probability of completing at least the 1st cycle of secondary school. Quantitatively, we can compute the counterfactual impact of banning emigration on the educational attainment of individuals aged between 14 and 18. Indeed, the percentage of dependents aged 14 to 18 who complete the 1st cycle of secondary is 75,90%. If we restrict their probability of emigration and the value of remittances to be 0, this percentage falls to 66,33%, showing a sizeable decrease on educational attainment for future generations.[32]

We can further extrapolate this decrease on educational attainment to the whole population of non-migrants. This exercise has several shortcomings because neither emigration conditions were the same for previous generations of children, nor the behaviour was the same in the past. However, this is a necessary step to obtain a potential counterfactual measure of a distribution of education for those who never emigrated if they would not have had the possibility to do it. Let us take the previous empirical model and assume that different birth cohorts had the same opportunities to emigrate when they were 12 than nowadays.[33]

Under these assumptions, let us take the proportion of individuals that completed the 1st cycle of secondary and estimate the overall cutoff point that corresponds to it, as in (12). We can then delete from it the part that is attributed to the possibility of emigration, as is made clear in (13). [34]

$$c = \Phi^{-1}\left(\Pr(educ > 9 \mid age >= 15, no\_emig)\right) \tag{12}$$

$$\Pr(educ > 9 \mid age >= 15, no\_emig, without\_possible\_emig) = \Phi^{-1}\left(c - \beta_1 \overline{P(mig \mid 12)} - \beta_2 \overline{remit}\right) \tag{13}$$

Following this strategy, the percentage of people in Cape Verde over 15 years old who finished the 1st cycle of secondary education would have fallen from the actual 41,70% to 29,52%.

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[32] The main factor is the probability of emigration. The effect of dropping remittances is marginal.

[33] Moreover, we assume that the flow of remittances was also similar, although this does not cause an important difference because the coefficient in front of the value of remittances is rather small.

[34] This means using the coefficients β_1 and β_2 from the previous empirical analysis and the mean probability of migration and remittances at the age of 12 that was observed for the group of dependents between 14 and 18.

Obtaining the overall counterfactual distribution of education would require performing the empirical exercise in the previous sub-sections for all educational levels. This is computationally feasible but results do not make much sense due to small sample problems.[35] In order to avoid this difficulty we keep the conditional structure of upper educational degrees given that the person finished the 1st cycle of secondary.[36]

Table 20 compares the actual and counterfactual education structure for non-emigrants over 15. The possibility of future migration seems to increase educational attainment by an average 16.7%.

6. Some counterfactual numbers on the "brain drain" vs. "brain gain" controversy

In the previous sections we proposed several ways to evaluate the impact of emigration on the distribution of schooling, which required moving beyond observable characteristics of residents and current emigrants. This is the case because not only emigrants might upgrade their schooling attainment after arrival at the destination country, but also because there is a positive impact from the possibility to emigrate on the educational attainment of residents. We now turn to using these results to compute the overall impact of emigration on education.

Section 5 estimates the counterfactual distribution of schooling for those who never emigrated. This distribution is an input to estimating the counterfactual distribution of education of emigrants and returning migrants: in section 4 we showed that each of these two distributions could be estimated by using the distribution of non-emigrants and a difference attributed to the relative selection of emigration. So we will now add the estimated differences to the counterfactual schooling distribution of non-emigrants. Then the overall distribution in Cape Verde will be:

$$P(s_1) = \frac{\overline{P(s_1 \mid Emig)}.Emig + \overline{P(s_1 \mid Non\_Emig)}.Non\_Emig + \overline{P(s_1 \mid Return\_Emig)}.Return\_Emig}{Emig + Non\_Emig + Return\_Emig} \qquad (14)$$

Where $\overline{P(s_1 \mid Emigrants)}$, $\overline{P(s_1 \mid Non\_Emigrants)}$ and $\overline{P(s_1 \mid Return\_Emig)}$ are the counterfactual estimates of the probability of obtaining a certain degree. Using the results in section 5, we know the counterfactual $\overline{P(s_1 \mid Non\_Emigrants)}$. With this probability in hand, we can calculate the other two:

$$\overline{P(s_1 \mid Emig)} = \overline{P(s_1 \mid Non\_Emig)} + Difference(Emig) \qquad (15)$$

$$\overline{P(s_1 \mid Return\_Emig)} = \overline{P(s_1 \mid Non\_Emig)} + Difference(Return\_Emig) \qquad (16)$$

[35] Notice that in order to estimate the schooling decisions for higher degrees we need to restrict the sample to individuals above 25 years of age who are still residing with their parents, and there are very few of them.
[36] Notice that most of the people in Cape Verde over 15 finish their studies before completing that degree, therefore we really think that our choice is the most relevant one.

Table 21 shows that the distribution of schooling in Cape Verde would change very little if those who are abroad returned (first vs. second column). Actually, since they are slightly positively selected and since they upgraded their degrees while abroad, the distribution of schooling in Cape Verde would slightly improve (around 1% per education category). This is the type of evidence that usually motivates brain drain stories and demands for emigration and immigration restrictions, whereas it should support demands for returning incentives for emigrants to come back home. Indeed, as apparent in the third column in table 18, our computations show that if emigration would have been banned in Cape Verde, the distribution of education would have suffered notably (up to 35% for the highest educated), which should constitute encouraging news for those who suggest that emigration may improve educational attainment at home.

A final note is deserved by the fact that the positive effects of emigration on educational attainment are likely to persist over time as human capital, whereas the "brain drain" losses can more easily be reverted either by returning migration or by falling numbers of emigrants as origin countries develop.

7. Concluding Remarks

This paper contributes to the important but still scarce existing literature on the effects of emigration in origin countries in various ways. It departs from the essential premise that choices of educational attainment may depend on the option to emigrate. This has several implications. First, in measuring brain drain, it introduces a correction for educational upgrading after emigration, which addresses an important shortcoming of existing studies assuming that the educational attainment of permanent and return emigrants would have been the same had they not emigrated. Second, it evaluated the channels through which household migration may affect educational attainment of children left behind. In order to do so, a new estimation method was proposed to explicitly test for the effect of the possibility of own future emigration on educational attainment – the original "brain gain" hypothesis. This estimation method uses full migration histories provided by our unique survey, which allow us to control for unobserved heterogeneity unlike existing studies.

Our results point to "brain drain" not being as serious a problem as traditionally thought. Indeed, this paper finds that massive emigration in Cape Verde has significantly encouraged the accumulation of human capital. The main channel through which this effect works does not seem to be neither remittances nor return migration, but educational gains associated with the possibility of own future emigration. Our estimates suggest that an increase in the probability of own migration by 1% increases the probability of completing intermediate secondary schooling by 1.9%.

The evidence obtained in this study should lead policymakers in both developing and developed countries not to devote their efforts to restricting migration flows of educated individuals. Not only are destination countries likely to benefit from the inflow of these immigrants, as is relatively consensual in the literature, but this may also be beneficial for origin countries as Cape Verde. Similar studies on other source countries of educated emigration could help corroborating this view.

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Appendix 1: Growth Accounting

In order to have an idea of the relative magnitude of the proximate sources of economic growth (physical and human capital accumulation, raw labor and total factor productivity (TFP) growth) in Cape Verde over the period 1990-2005, we conduct a growth accounting exercise in the spirit of Solow (1957)'s classical work.

We follow Hall and Jones (1999), in assuming the aggregate per worker production function:

$$Y_t / L_t = A_t . (K_t / Y_t)^{\alpha / 1-\alpha} . exp (r . S_t) \quad \text{(A1)}$$

where Y denotes aggregate output, A is total factor productivity (TFP), K the capital stock, L the number of workers (or raw labor), S the average worker's years of schooling, r the average return on year of schooling, α the labor share of national income and t the time period.[37]

Per worker production (A1) is nested within aggregate per capita output in order to consider the effects on this latter variable:

$$Y_t / N_t = (Y_t / L_t) * (1 - u) * (N_t^A / N_t^{15-64}) * (N_t^{15-64} / N_t) \quad \text{(A2)}$$

where N denotes total resident population, u stands for the unemployment rate, N^A for active population (broadly defined as those residents aged 15 to 64 that are available to work), and N^{15-64} for the resident population aged between 15 and 64.

In order to perform this growth accounting exercise, we used population and labor census data from Cape Verde's National Statistics Office (INE) to obtain N, N^{15-64}, N^A and u in 1990 and 2000. We also used INE's information on national income to compute α, the average labor share of national income between 1990 and 2000.[38] Employment and investment data used to compute the capital stock (following the perpetual inventory method with a depreciation rate of 10%) comes from the World Development Indicators, WDI (2006). Years of education were estimated based on information from the 1990 and 2000 census, kindly provided by the INE as well. The return to years of schooling comes from Psacharopoulos and Patrinos (2004).

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[37] This per worker version of aggregate production can be derived from the aggregate production function: $Y_t = (K_t)^{\alpha} . (A_t.H_t)^{1-\alpha}$, where human capital H_t takes the form $H_t = exp (r . S_t).L_t$.

[38] The average labor share of national income between 1990 and 2000 was 45%. It is sensible that it is lower than the usual 2/3 applying to industrial countries: in Cape Verde, even though the tertiary structure of the economy is not very different from that of more developed countries, self-employment, temporary employment or unemployment are the norm and this is not taken into account included in the formal labor share. In the final robustness check section, we show that taking into account labor income of self-employed does not make much difference.

Our results show human capital accumulation as the driving force of Cape Verde's economic growth per worker in the recent decades, much more so than physical capital accumulation or TFP growth. This is better understood if one looks at 5-year subperiod included in our period of analysis, 1990-2005. Indeed, the first sub-period immediately follows democratization and the associated high investment inflows and turmoil period, plausibly responsible for the observed fall in TFP. The following periods witness the decline of investment rates to lower levels, whereas TFP gains materialize. Throughout the whole period, important human capital gains are materialized.

Table A1 – Growth decomposition for Cape Verde, 1990-2005

Growth Decomposition	lnH	lnA	lnK-lnY
1990-2005	88.4%	17.7%	-6.1%
1990-1995	103.4%	-21.1%	17.7%
1995-2000	86.9%	41.4%	-28.3%
2000-2005	81.7%	19.9%	-1.6%

Table A2 – Average annual growth rates for Cape Verde, 1990-2005

Average Annual Growth Rates	Y	E	K	Y/E	K/Y	A	H
1990-2005	6.3%	2.2%	5.6%	4.0%	-0.7%	0.7%	3.5%
1990-1995	5.2%	2.4%	6.6%	2.7%	1.3%	-0.6%	2.8%
1995-2000	8.4%	4.2%	5.0%	4.0%	-3.1%	1.6%	3.5%
2000-2005	5.2%	0.0%	5.0%	5.2%	-0.2%	1.0%	4.2%

Appendix 2: Classification of Educational Attainment

It is difficult to compare educational attainment from different sources since their classifications often vary. In all data sets, there are questions regarding complete levels of education. However, the disaggregation level is higher in some sources, which may make it difficult to draw comparisons with sources adopting lower disaggregation levels. For instance, Docquier and Marfouk (2006) identify the selection of migrants in three educational groups: less than 9 years of schooling (low education), 9-12 years of schooling (medium) and over 13 (high). The Portuguese and the American census allow grouping migrants in such way since the group of people who have some college without having finished the degree (13-14 years of schooling) is identified separately. However, in the Cape Verdean census and in our survey, individuals must be classified either at the pre-university level (12 years of schooling) or at the completed university level (at least 15 grades of schooling). Therefore, the pre-university level also includes people who did not finish their university degree.

As is detailed in table A3 below, we group individuals in 4 groups: less than 1st cycle of secondary (less than 9 years of schooling), completed 1st cycle of secondary (between 9 and 11 years of schooling), completed 2nd cycle of secondary (between 12 and 14 years of schooling) and completed university degree (15 years of schooling or more). In comparison with Docquier and Marfouk (2006), both classifications have the same low education group (less than 9 years). However, adding our second and third groups encompasses more than their intermediate group since our third group includes individuals who did not finish their university degree. For the same reason, our top group of education should be smaller than their high skilled.

In order to compute the educational attainment of emigrants who reside abroad we took the information from the Portuguese and the American census. This should account for almost 75% of the whole set of emigrants.[39]

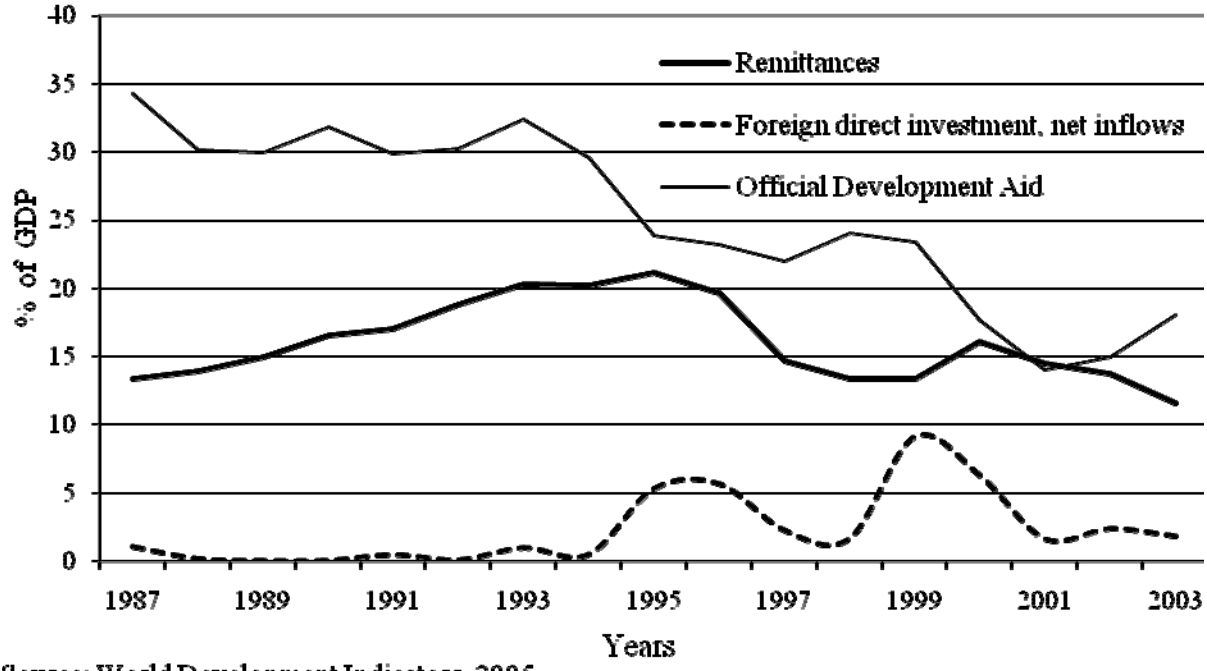
[39] The average emigrant is 60% from Portugal and 40% from the US. Another relatively important emigration destination for Cape Verdeans is France (amounting to 12% of total emigration). If we consider immigrants in France coming from African countries that do not speak French, we verify that the selection pattern is similar to the selection we observe for the United States. On the other hand, the Spanish census gives information on the educational attainment of Cape Verdeans. Even though the information coming from the Spanish census does not match perfectly our four categories, the observed emigrant selection appears to be almost the same as that coming from the Portuguese census. This evidence reinforces the idea that selection patterns closely follow lingual distances: Spanish is very similar to Portuguese, whereas French and English are not. This could lead us to consider two groups of destinations: Portugal, Brazil, Spain and South American countries as opposed to US, France and other destinations. Such a world would not be very different from the world we are considering with our weighted average of Portugal and the US as destinations.

Table A3 – Comparison of educational classifications in Portugal (census), United States (census) and Cape Verde (survey)

	Portugal 2001		United States 2000 (Completed)	Cape Verde 2006 (Completed)
LESS THAN 1ST CYCLE OF SECONDARY		No schooling	Not applicable and no school (0,1)	Iliterate (1)
		Preschool		Pre-primary (2)
	1º Ciclo = 4 years of schooling	Attending	1-4 grades (4)	Attending Primary (3)
		Incomplete		
		Complete		
	2º Ciclo = 6 years of schooling	Attending		
		Incomplete		
		Complete		
	3º Ciclo = 9 years of schooling	Attending		Complete primary (4)
		Incomplete	5-8 grades (5)	From 6 to 9 grades (5)
COMPLETED 1ST CYCLE OF SECONDARY		Complete	9 grades (6)	Secondary (6)
			10 grades (7)	
	Secundário = 12 years of schooling	Attending	11 grades (8)	
		Incomplete	12 grades (no diploma) (9)	
COMPLETED 2ND CYCLE OF SECONDARY		Complete	High school graduate (10)	Pre-University (7)
			Some College no degree (11)	
			Associate degree/occupational (12)	
	Médio = 14 years of schooling	Incomplete		
		Complete	Professional degree (16)	
	Bacharelato = 15 years of schooling	Attending		
		Incomplete		
	Licenciatura = 17 years of schooling	Attending		
		Incomplete		
COMPLETED UNIVERSITY	Bacharelato	Complete	Bachelor (14)	Bachelor (8)
	Licenciatura	Complete		University (9)
	Mestrado >= 17 years of schooling	Attending		
		Incomplete		
		Complete	Master (15)	
	Doutoramento >= 20 years of schooling	Attending		
		Incomplete		
		Complete	Doctorate (17)	

Figures

Figure 1: Remittances, FDI and Aid in Cape Verde.



Source: World Development Indicators, 2005.

Figure 2: Difference in percentage not entrolling in intermediate secondary schooling per age of entry in the United States

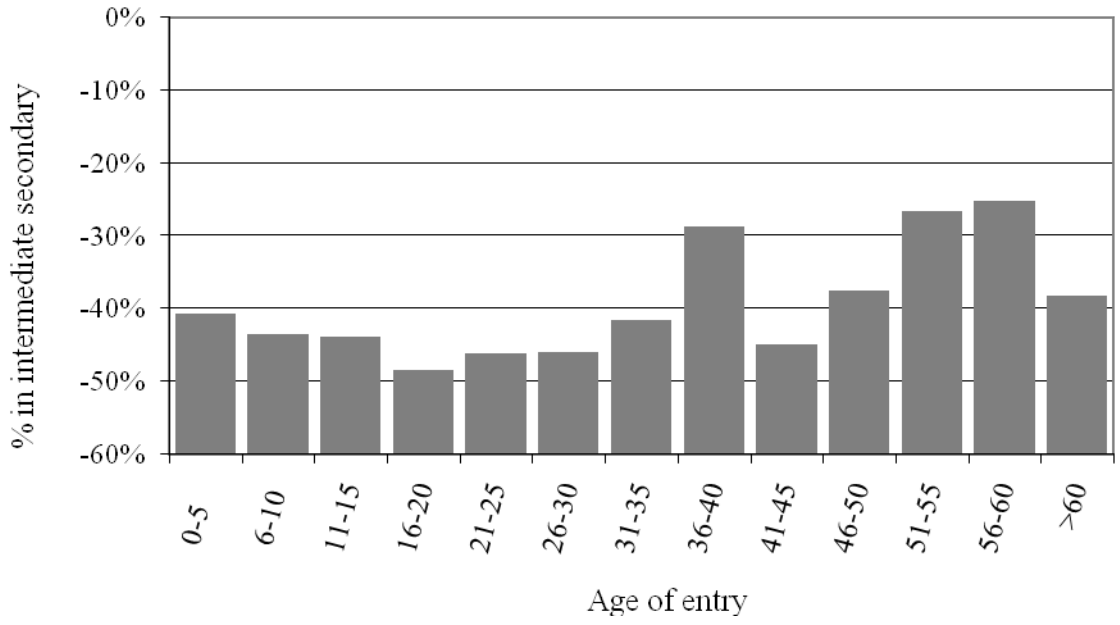


Figure 3: Difference in percentage completing intermediate secondary schooling per age of entry in the United States

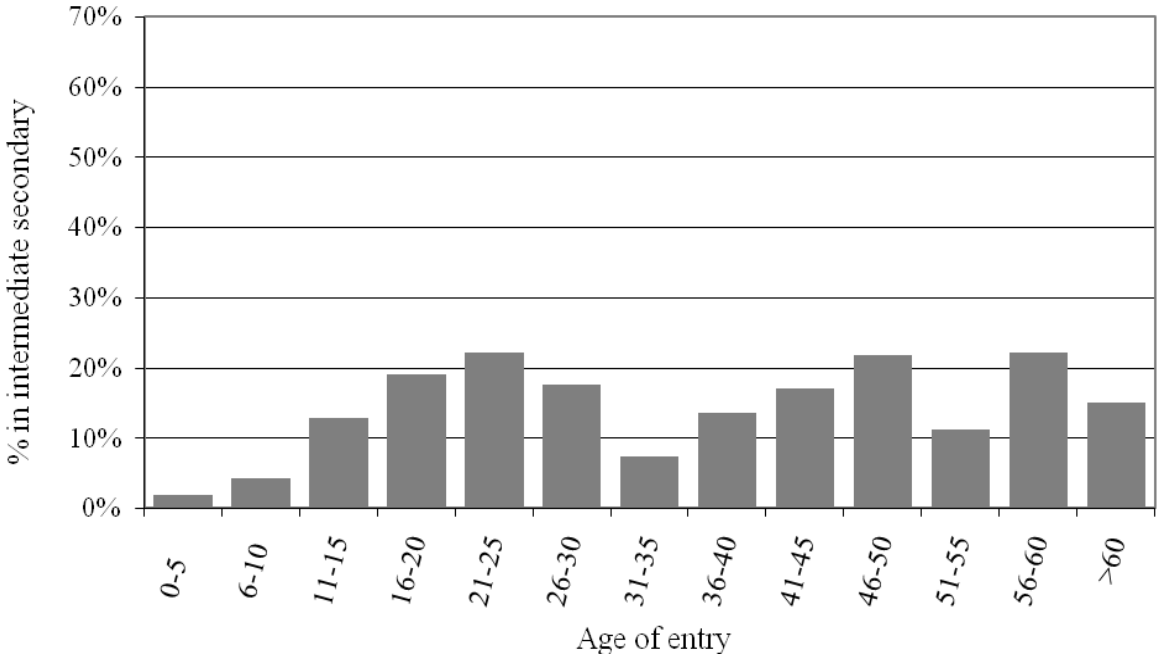


Figure 4: Difference in percentage completing secondary schooling per age of entry in the United States

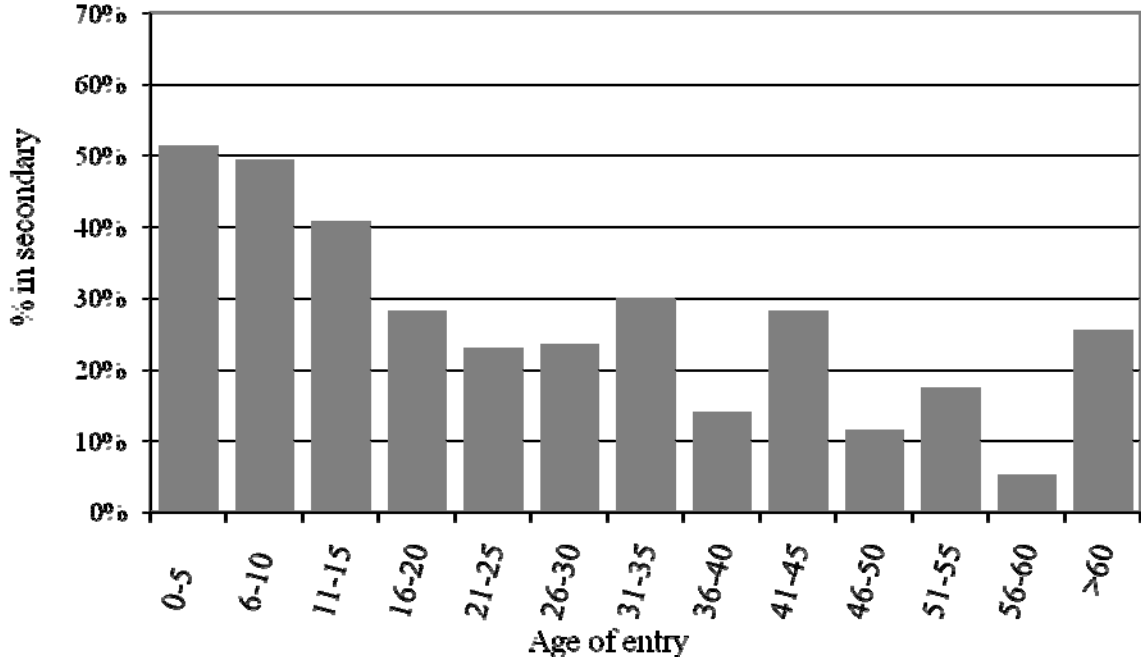


Figure 5: Difference in percentage completing university per age of entry in the United States

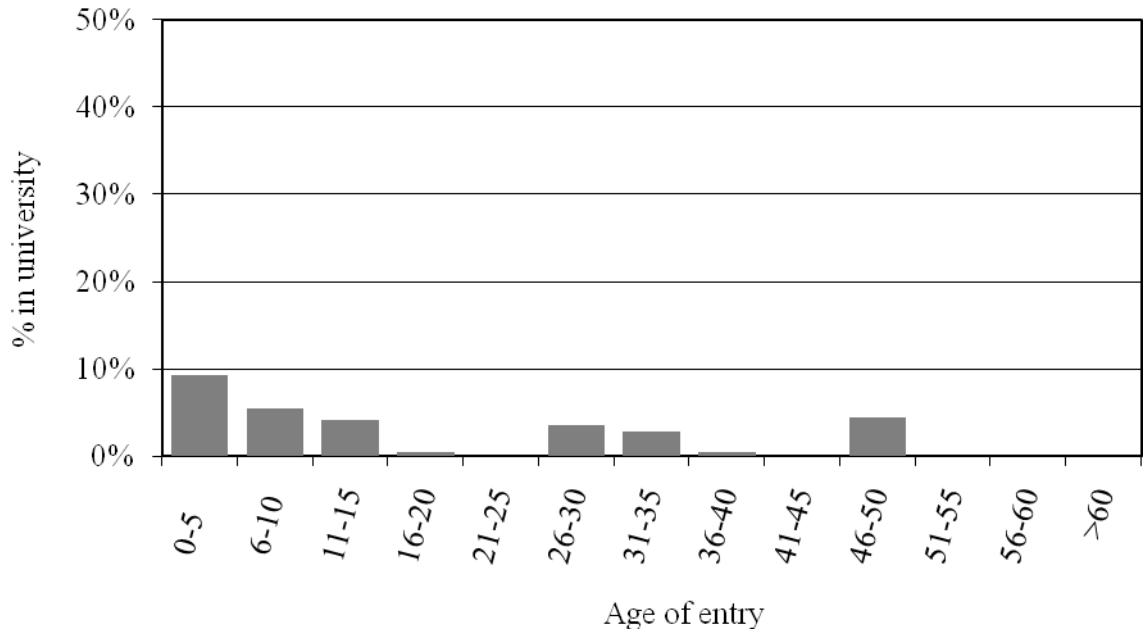
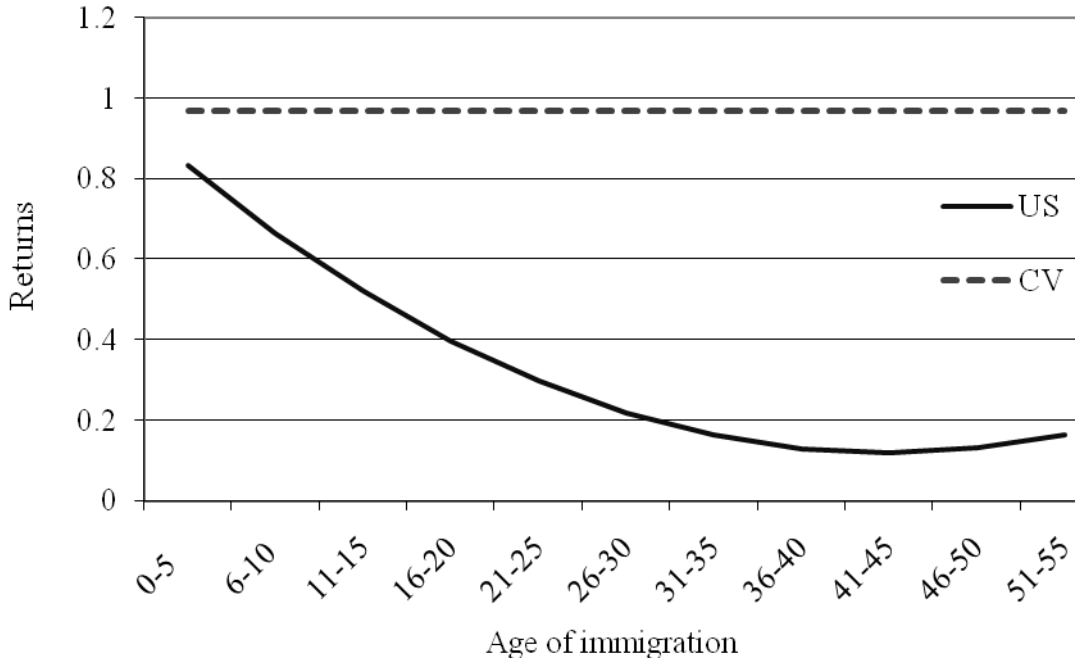


Figure 6: Returns to secondary education by age of immigration. Males.



Tables

Table 1: Basic demographics from the sample and WDI (2005)

	Residents in survey (2006)	WDI (2005)
Gender		
Male population	47.38%	48%
Age		
Population between 15-64 years	58.06%	56.17%

Source: WDI and own survey.

Table 2: Basic demographics from the sample and INE (2000)

	Residents in survey (2006)	INE (2000)
Gender		
Male population	47.38%	48.42%
Age		
0-9 years	22,05%	27.45%
10-19 years	29,45%	26.06%
20-29 years	13,17%	15.18%
30-39 years	12,89%	12.40%
40-49 years	9,95%	7.34%
50-59 years	4,20%	2.99%
60-69 years	3,74%	4.41%
70-79 years	3,22%	2.67%
>79 years	1,34%	1.51%
Education 15-64		
No Education	10,11%	13.9%
Pre-school	1,39%	0.2%
Alphabetized	11,05%	4.3%
Primary	53,76%	52.6%
Secondary	20,83%	26.4%
Tertiary	2.86%	2.69%

Source: INE and own survey.

Table 3: Labor situation of residents over 15 years

	Residents in survey (2006)	INE (2000) (*)	WDI (2005) Total Pop.	Observatory Unemployment (2005) Total Pop.
Activity rate	65.30%	62.84%	60.26%	
Unemployment rate	36.55%	17.23%		21%

Source: INE, WDI, Observatory of Unemployment and own survey.

(*) The definition of activity rate is strict (working and actively looking for a job), whereas that of unemployment rate is broad.

Table 4: Importance of migration in the sample and INE

	Survey (2006)	INE (2000)
Flow of migrants/Residents in CV		
Between 2000-2005	3.33%	
Between 1995 and 2000		2.80%
Flow of return migrants/current migrants		
Between 2000-2005	22%	
Between 1995 and 2000		25%
Stock of migrants abroad/Residents in CV	8.77%	18% (*)

Source: INE and own survey.

(*) Own calculations with international censuses

Table 5: Destinations of Cape Verdean Emigrants, Percentage of Total Emigration

	Survey, all years	1995-2000 census(*)
Portugal	57.2	55
US	16.97	19
France	13.65	8
Brazil	2.95	-
Netherlands	1.85	5
Luxemburg	1.48	-
Italy	1.11	-
Russia	1.11	-
Switzerland	0.74	-
Senegal	0.74	-
Guinea	0.74	-
Spain	0.37	-
Angola	0.37	-
Cuba	0.37	-
Others	0.35	13

Source: Our survey and INE (2000).

Table 6: Characteristics of migrants who are abroad

	Censuses				Survey 2006	Census 2000
	Portugal (2001)	United States (2001)	France (2001)	Total	Residents in CV	Residents in CV
Total	44,060	27,059	12,140	100,030	583	431,989
Percentage of destination given the destination of permanent emigrants abroad	57.20%	16.97%	13.65%	92.60%		
Gender						
Male population	51.27%	51.31%	46.12%	45.45%	52.14%	48.42%
Age						
0-10 years	7.85%	3.21%	14.02%	6.36%	0.52%	27.45%
11-20 years	14.17%	16.58%	15.17%	13.49%	11.28%	26.06%
21-30 years	20.06%	16.44%	14.28%	16.61%	33.85%	15.18%
31-40 years	24.66%	21.14%	32.89%	23.44%	25.00%	12.40%
41-50 years	20.33%	19.25%	14.80%	18.39%	20.31%	7.34%
51-60 years	5.82%	8.96%	4.08%	6.25%	7.99%	2.99%
61-70 years	4.73%	8.03%	3.33%	4.96%	0.87%	4.41%
71-80 years	1.74%	3.80%	1.05%	2.02%	0.17%	2.67%
81-90 years	0.58%	2.04%		0.90%	0.00%	
>90	0.07%	0.54%	0.38%	0.18%	0.00%	1.51%
Population >15	37,479	23,945	9,517	79,511	705	257,115
Educational degree (*)						
Less than intermediate secondary	75.55%	25.68%		56.11%	59.21%	67.60%
Completed intermediate secondary (9 grades)	14.57%	29.73%		20.48%	13.74%	
Completed secondary (12 grades)	8.44%	38.73%		20.25%	12.46%	30.60%
Completed University	1.44%	5.86%		3.16%	14.59%	1.80%

(*) Individuals older than 15.

Table 7: Age at immigration for emigrants over 15

Less than 10 years	18,13%
11-20 years	26,92%
21-30 years	26,05%
31-40 years	15,46%
41-50 years	6,25%
51-60 years	3,74%
>61 years	3,45%

Source: Own survey.

Table 8: Educational attainment of residents in CV and non residents over 15 years old

	Survey		Censuses	Censuses
	Residents in CV	Residents abroad	Residents abroad	Counterfactual studies at home
Prob of migration (residing abroad)		23,62%	23,62%	23,62%
Less than 1st cycle of secondary	58,30%	59,21%	56,11%	56,58%
Completed 1st cycle of secondary (9 grades)	20,62%	13,74%	20,48%	22,47%
Completed 2nd cycle of secondary (12 grades)	17,83%	12,46%	20,25%	18,37%
Completed University	3,25%	14,59%	3,16%	2,58%

Source: Own survey and censuses of the main destination countries (Portugal and United States).

Table 9: Alternative measures of the "brain drain". Probability of migration given a degree

	Censuses	Censuses. Counterfactual studies at home
Prob of migration (residing abroad)	23,62%	23,62%
1st cycle of secondary (9 grades) or more	24,56%	24,35%
2nd cycle of secondary (12 grades) or more	25,56%	2350%
University degree or more	23,12%	19.69%

Source: Own computations.

Table 10: Educational attainment of non-migrants and returning migrants.

	CENSUSES	SURVEY	
	Residents abroad	Residents in Cape Verde	Returning migrants
Total (*)	100.030	583	205
Percentage over population over 15 years old	23,62%		
Percentage over migrants over 15 years old			10,09%
Gender			
Male population	45,45%	52,14%	64,30%
Age			
0-10 years	6,36%	0,52%	2,19%
11-20 years	13,49%	11,28%	4,37%
21-30 years	16,61%	33,85%	7,10%
31-40 years	23,44%	25,00%	20,77%
41-50 years	18,39%	20,31%	14,75%
51-60 years	6,25%	7,99%	12,57%
61-70 years	4,96%	0,87%	16,94%
71-80 years	2,02%	0,17%	18,58%
81-90 years	0,90%		2,73%
>90	0,18%	0,00%	0,00%
Educational degree (**)			
Less than 1st cycle of secondary	56,11%	59,21%	74,00%
Completed 1st cycle of secondary (9 grades)	20,48%	13,74%	6,67%
Completed 2nd cycle of secondary (12 grades)	20,25%	12,46%	13,33%
Completed University	3,16%	14,59%	6,00%

(*)Citizenship of Cape Verde instead of born in Cape Verde. For the total is the sum of all migrants in all the previous censuses /0.92
For returning migrants is the total number of residents in Cape Verde* the percentage of returning migrants in the survey (2,46%)
(**) Individuals older than 15.

Table 11: Age at immigration of returning migrants over 15 years old

	Percentage	Mean duration
Less than 10 years	6,92%	10,60
11-20 years	16,35%	8,77
21-30 years	24,53%	7,72
31-40 years	25,16%	6,05
41-50 years	12,58%	3,85
51-60 years	4,40%	2,71
>61 years	10,06%	1,31

Source: Own survey

Table 12: Educational attainment of returning migrants before and after migration. Over 15 years old.

	Returning migrants before migration	Returning migrants after migration
Less than 1st cycle of secondary	75,82%	74,00%
Completed 1st cycle of secondary (9 grades)	10,46%	6,67%
Completed 2nd cycle of secondary (12 grades)	7,84%	13,33%
Completed University	5,88%	6,00%

Source: Own survey.

Table 13: Differences of education percentages between returning migrants and non- migrants

	(1) <9	(2) 9-12	(3) 13-15	(4) >15
Female	-0.0837	0.0399	-0.0226	0.0664
	(0.0584)	(0.0430)	(0.0515)	(0.0398)
Positive gain	-0.3941	-0.0194	0.3313	0.0823
	(0.0988)**	(0.0727)	(0.0871)**	(0.0674)
Constant	-0.0266	-0.0296	0.0533	0.0028
	(0.0353)	(0.0260)	(0.0311)	(0.0241)
Observations	150	150	150	150
R-squared	0.11	0.01	0.09	0.03

Standard errors in parentheses
* significant at 10%; ** significant at 5%

Table 14: Educational attainment of residents in CV and non-returning migrants over 15 years old

	Survey Returning migrants	Counterfactual Returning migrants
Prob of returning migrant (respect total pop.)	3,12%	3,12%
Less than 1st cycle of secondary	74,00%	76,10%
Completed 1st cycle of secondary (9 grades)	6,67%	6,64%
Completed 2nd cycle of secondary (12 grades)	13,33%	11,76%
Completed University	6,00%	5,50%

Source: Own computations

Table 15: Probability of completing intermediate secondary schooling for dependents aged 14 to 18.

	(1) probit	(2) probit	(3) ivprobit	(4) ivprobit
Migrant in the family		0.0130	1.7826	2.2500
		(0.0389)	(0.9971)*	(0.1735)***
Proportion of educated emigrants in the locality				-8.2353
				(3.0221)***
Male	-0.0401	-0.0405	-0.0807	0.0016
	(0.0335)	(0.0336)	(0.1298)	(0.0355)
Age	0.6051	0.6054	1.8445	0.6235
	(0.3040)**	(0.3044)**	(1.9212)	(1.2190)
Age^2	-0.0185	-0.0185	-0.0568	-0.0193
	(0.0095)*	(0.0095)*	(0.0591)	(0.0094)
Number of children in the household	-0.0174	-0.0179	-0.1124	-0.0958
	(0.0092)*	(0.0091)**	(0.0275)***	(0.0262)***
Asset ownership (land, house or car)	0.0055	0.0046	-0.0736	0.0330
	(0.0467)	(0.0464)	(0.1529)	(0.1467)
Not credit constrained	0.0398	0.0393	0.1265	0.0839
	(0.0734)	(0.0735)	(0.2459)	(0.1838)
Highest education attained in the household	0.0615	0.0610	0.0523	0.0397
	(0.0076)***	(0.0076)***	(0.1589)	(0.0724)
Perceived quality of educational system in Cape Verde	0.0311	0.0310	0.0299	-0.0246
	(0.0139)**	(0.0139)**	(0.0953)	(0.0572)
Local ratio of educated to non-educated individuals	0.2004	0.2014	0.4834	-0.1266
	(0.1827)	(0.1821)	(0.6172)	(0.2624)
Local average unemployment	-0.9917	-0.9847	-2.4664	0.3868
	(0.4858)**	(0.4847)**	(2.6200)	(2.0124)
Local average yearly expenditure per capita	-0.9431	-0.9378	-2.1571	1.6580
	(0.7054)	(0.7024)	(2.5727)	(2.4341)
Urban, Island controls	Included	Included	Included	Included
Observations	679	679	608	608

Robust standard errors in parentheses, clustered at the household level.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16: Probability of emigration for dependents aged 19 to 30.

	(1)	(2)	(3)
	1st step probit	1st step logit	1st step OLS
Male	-0.0424	-0.3157	-0.0443
	(0.0227)*	(0.1719)*	(0.0233)*
Age	0.0389	0.3114	0.0403
	(0.0479)	(0.3655)	(0.0471)
Age^2	-0.0006	-0.0050	-0.0006
	(0.0010)	(0.0074)	(0.0010)
Household size	-0.0276	-0.2048	-0.0263
	(0.0052)***	(0.0415)***	(0.0048)***
Number of children in the household	0.0058	0.0425	0.0063
	(0.0046)	(0.0338)	(0.0047)
Asset ownership (Land, House, Car)	0.0734	0.6468	0.0766
	(0.0283)***	(0.2979)**	(0.0314)**
No_credit_constraints	0.0588	0.4182	0.0601
	(0.0381)	(0.2452)*	(0.0398)
Emigrant in the family	0.1030	0.7537	0.1103
	(0.0555)*	(0.3879)*	(0.0610)*
Age of (first) emigrant in the family	-0.0057	-0.0428	-0.0059
	(0.0017)***	(0.0128)***	(0.0017)***
Gender of (first) emigrant in the family	-0.0522	-0.4667	-0.0657
	(0.0344)	(0.3090)	(0.0407)
Return emigrant in the family	-0.0305	-0.2161	-0.0138
	(0.0327)	(0.2627)	(0.0385)
Local proportion of emigrants to residents	0.6701	4.7069	0.7126
	(0.1785)***	(1.2815)***	(0.2053)***
Perceived quality of political system	-0.0002	0.0024	0.0002
	(0.0060)	(0.0459)	(0.0061)
Optimism towards future of Cape Verde	-0.0131	-0.0999	-0.0137
	(0.0085)	(0.0657)	(0.0082)*
Confidence in Oxford	0.0155	0.1139	0.0163
	(0.0093)*	(0.0708)	(0.0090)*
Urban, Island controls	Included	Included	Included
Observations	1240	1240	1240

Robust standard errors in parentheses, clustered by household.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 17: Probability of completing intermediate secondary schooling for dependents aged 14 to 18.

	(1)	(2)	(3)	(4)	(5)	(6)
Probability of own future migration	1.0717	2.4419	1.4680	1.8359	1.8251	1.9143
	(.6045)*	(1.5675)	(.7013)**	(0.8174)**	(0.822)**	(.8791)**
Probability of own future migration^2		-7.7396				
		(8.1277)				
Proportion of educated emigrants in the locality			-.4881	-0.4344	-0.4265	-.4856
			(.4112)	(0.3725)	(0.3853)	(.4655)
Mother absent from household				-0.033	-0.0354	-.0454
				(0.0697)	(0.0704)	(.0654)
Father absent from household				-0.1246	-0.1275	-.126
				(0.0381)***	(0.039)***	(.04157)***
Value of international remittances					0.0006	
					(0.0008)	
Instrumented value of international remittances						.0009
						(.0009)
Male	-.0254	-.0201	-.0224	-0.0193	-0.0208	-.0209
	(.0340)	(0.0352)	(.0346)	(0.0394)	(0.039)	(.0388)
Age	.8688	0.8678	.8537	0.9019	0.8886	.9294
	(.3090)***	(0.3093)***	(.3115)***	(0.3402)**	(0.3473)**	(.375)**
Age^2	-.0268	-0.0268	-0.0264	-0.0278	-0.0274	-.0286
	(.0096)***	(0.0096)***	(0.0097)***	(0.0106)**	(0.0108)**	(.0116)**
Number of children in the household	-.01820	-0.0174	-0.0178	-0.0207	-0.0206	-.0221
	(.0134)	(0.0134)	(0.0133)	(0.0132)	(0.0134)	(.01396)
Asset ownership (land, house or car)	-.01074	-0.0195	-.0239	-0.0333	-0.0356	-.0382
	(.0476)	(0.0476)	(0.0471)	(0.0466)	(0.0457)	(.0499)
Not credit constrained	0.0013	-0.0057	-.0060	-0.0247	-0.0296	-.0367
	(0.1063)	(0.1105)	(0.1083)	(0.0985)	(0.1009)	(.0906)
Highest education attained in the household	0.0574	0.0568	.0579	0.0578	0.0581	.0575
	(0.0073)***	(0.0073)***	(0.0072)***	(0.0085)***	(0.0086)***	(.0085)***
Perceived quality of educational system in Cape Verde	.02533	0.0249	.0256	0.0213	0.0203	.0186
	(.0156)	(0.0154)	(.0158)	(0.0167)	(0.0167)	(.0159)
Local ratio of educated to non-educated individuals	.1631	0.1569	.1023	0.1479	0.1471	.1357
	(.2167)	(0.2195)	(0.2200)	(0.2322)	(0.2309)	(.2487)
Local average unemployment	-.9871	-1.0744	-1.0786	-1.0378	-0.9836	-1.1075
	(.5228)*	(0.5343)**	(0.5245)**	(0.5346)*	(0.5566)*	(.5044)**
Local average yearly expenditure per capita	-1.0862	-1.1923	-.9618	-1.1762	-1.1235	-1.1776
	(.8480)	(0.8474)	(0.8560)	(0.7952)	(0.7983)	(.7931)
Urban, Island controls	Included	Included	Included	Included	Included	Included
Observations	608	608	608	606	606	604

Bootstrapped standard errors in parentheses, clustered at the household level.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 18: Probability of emigration for dependents aged 19 to 30.

	Baseline	(1)	(2)	(3)	(4)
Male	-0.0424	-0.0340	-0.0352	-0.0409	-0.0427
	(0.0227)*	(0.0226)	(0.0220)	(0.0225)*	(0.0221)*
Age	0.0389	0.0476	0.0423	0.0364	0.0427
	(0.0479)	(0.0490)	(0.0462)	(0.0480)	(0.0466)
Age^2	-0.0006	-0.0008	-0.0007	-0.0006	-0.0007
	(0.0010)	(0.0010)	(0.0009)	(0.0010)	(0.0009)
Household size	-0.0276	-0.0290	-0.0274	-0.0263	-0.0261
	(0.0052)***	(0.0054)***	(0.0050)***	(0.0051)***	(0.0050)***
Number of children in the household	0.0058	0.0058	0.0053	0.0056	0.0055
	(0.0046)	(0.0046)	(0.0045)	(0.0046)	(0.0045)
Asset ownership (Land, House, Car)	0.0734	0.0736	0.0681	0.0733	0.0772
	(0.0283)***	(0.0289)**	(0.0283)**	(0.0286)**	(0.0272)***
Not credit constrained	0.0588	0.0621	0.0643	0.0684	0.0568
	(0.0381)	(0.0371)*	(0.0384)*	(0.0385)*	(0.0366)
Emigrant in the family	0.1030	0.1309	0.0836	0.1128	0.1182
	(0.0555)*	(0.0581)**	(0.0551)	(0.0562)**	(0.0531)**
Age of (first) emigrant in the family	-0.0057	-0.0058	-0.0053	-0.0060	-0.0058
	(0.0017)***	(0.0018)***	(0.0017)***	(0.0018)***	(0.0016)***
Gender of (first) emigrant in the family	-0.0522	-0.0641	-0.0387	-0.0556	-0.0600
	(0.0344)	(0.0343)*	(0.0350)	(0.0338)	(0.0317)*
Return emigrant in the family	-0.0305	-0.0165	-0.0262	-0.0236	-0.0305
	(0.0327)	(0.0353)	(0.0330)	(0.0328)	(0.0311)
Local proportion of emigrants to residents	0.6701		0.6670	0.6542	0.6441
	(0.1785)***		(0.1752)***	(0.1757)***	(0.1706)***
Perceived quality of political system	-0.0002	-0.0013		-0.0010	-0.0026
	(0.0060)	(0.0061)		(0.0060)	(0.0058)
Optimism towards future of Cape Verde	-0.0131	-0.0143	-0.0115		-0.0159
	(0.0085)	(0.0087)	(0.0083)		(0.0082)*
Confidence in Oxford	0.0155	0.0164	0.0146	0.0173	
	(0.0093)*	(0.0096)*	(0.0090)	(0.0090)*	
Urban, Island controls	Included	Included	Included	Included	Included
Observations	1240	1240	1287	1260	1291

Robust standard errors in parentheses, clustered by household.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 19: Probability of completing intermediate secondary schooling for dependents aged 14 to 18.

	(1)	(2)	(3)	(4)	(5)	(6)
Probability of own future migration	2.2702	4.175	2.2842	2.9117	2.8565	2.9162
	(1.1100)*	(3.1733)	(1.1145)*	(1.2627)**	(1.2879)**	(1.5387)*
Probability of own future migration^2		-18.0383				
		(31.989)				
Proportion of educated emigrants in the locality			-.0618	.096	0.1017	0.0814
			(.3418)	(.3148)	(0.3262)	(0.3570)
Mother absent from household				-0.037	-0.0394	-0.0466
				(0.0700)	(0.0708)	(0.0645)
Father absent from household				-0.1276	-0.1299	-0.1278
				(0.0393)***	(0.04)***	(0.0421)***
Value of international remittances					.0005	
					(0.0008)	
Instrumented value of international remittances						.0007
						(.0009)
Male	-0.0235	-0.02	-0.0237	-0.021	-0.0226	-0.0229
	(0.0351)	(0.0346)	(0.0353)	(0.0390)	(0.0388)	(0.04)
Age	0.8533	0.8831	0.8506	.8979	.8868	.9264
	(0.3085)***	(0.3119)***	(0.3109)***	(.3397)**	(.3478)**	(.3654)**
Age^2	-0.0263	-0.0273	-0.0263	-0.0277	-0.0274	-0.0285
	(0.0096)***	(0.0097)***	(0.0097)***	(0.0106)**	(0.0108)**	(0.0113)**
Number of children in the household	-0.0171	-.01658	-.0172	-0.0199	-0.0199	-0.0211
	(0.013)	(.0127)	(.0131)	(0.013)	(0.0133)	(0.0137)
Asset ownership (land, house or car)	-0.0259	-0.0334	-0.0268	-0.0378	-0.0393	-0.0393
	(0.0464)	(0.0478)	(0.0470)	(0.0447)	(0.0441)	(0.0505)
Not credit constrained	-0.0173	-0.0151	-0.0172	-0.038	-0.0415	-0.0485
	(0.1106)	(0.1108)	(0.1114)	(0.1001)	(0.1029)	(0.0971)
Highest education attained in the household	0.057	0.0567	0.0571	0.0567	0.057	0.0566
	(0.0073)***	(0.0076)***	(0.0073)***	(0.0086)***	(0.0087)***	(0.0085)***
Perceived quality of educational system in Cape Verde	0.0236	0.0233	0.0238	0.019	0.0181	0.017
	(0.0158)	(0.0158)	(0.0158)	(0.0168)	(0.0168)	(0.016)
Local ratio of educated to non-educated individuals	0.1208	0.1337	0.1101	0.1562	0.1542	0.1499
	(0.2088)	(0.2109)	(0.2168)	(0.2267)	(0.2257)	(0.2474)
Local average unemployment	-1.1113	-1.0995	-1.1253	-1.1021	-1.0551	-1.1541
	(0.5111)**	(0.5119)**	(0.5207)**	(0.5260)**	(0.5499)*	(0.5071)**
Local average yearly expenditure per capita	-1.0378	-1.0683	-1.0074	-1.2296	-1.182	-1.2321
	(0.8152)	(0.8123)	(0.8471)	(0.7951)	(0.8021)	(0.8025)
Urban, Island controls	Included	Included	Included	Included	Included	Included
Observations	608	608	608	606	606	604

Bootstrapped standard errors in parentheses, clustered at the household level.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 20: Actual educational attainment of residents in CV over 15 years old and counterfactual estimation

	Survey Non migrants	Counterfactual Non migrants
Less than intermediate secondary	58,30%	70,48%
Intermediate secondary (9 grades)	20,62%	14,60%
Completed secondary (12 grades)	17,83%	12,62%
Completed university	3,25%	2,30%

Source: Own computations.

Table 21: Educational attainment of Cape Verdean citizens over 15 years old and counterfactual distribution

	Actual in CV	Counterfactual 1: Actual in CV + Emigrants	Counterfactual 2: No emigration
Less than intermediate secondary	59,01%	58,78%	70,50%
Intermediate secondary (9 grades)	19,94%	19,97%	14,70%
Completed secondary (12 grades)	17,64%	18,16%	12,60%
Completed university	3,41%	3,08%	2,20%

Source: Own computations.