the review of income and wealth

Review of Income and Wealth
Series 59, Special Issue, October 2013
DOI: 10.1111/roiw.12037

SOCIAL MOBILITY IN FIVE AFRICAN COUNTRIES

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This paper conceptualizes intergenerational occupational mobility between the farm and non-farm sectors in five African countries, measures it using nationally representative household survey data, and analyzes its determinants through a comparative method based on pooled logit regressions. We first analyze intergenerational gross mobility. Until the end of the 1980s, intergenerational flows toward the non-farm sector are high in Côte d'Ivoire and Guinea, flows toward the farm sector are more often observed in Ghana and Uganda, and Madagascar displays less mobility in either direction. The pace of change in occupational structures and the magnitude of labor income dualism between the farm and non-farm sectors appear to explain those differences. We then net out structural change across generations and establish the first measurement of intergenerational net mobility in those five African countries. Ghana and Uganda stand out as relatively more fluid societies. Côte d'Ivoire and Guinea come next while Madagascar shows a particularly high reproduction of occupations. Educational mobility accounts for the Madagascar exception to a large extent, but not for the differences between the other countries. Spatial dualism of employment, i.e. the geographic segregation of farm and non-farm jobs, accounts for most of those remaining differences. We argue that the main determinants of intergenerational mobility, namely income and employment dualisms, likely reflect a historical legacy of different colonial administrations.

JEL Codes: J62, O15, N37

Keywords: Africa, colonization, dualism, inequality, intergenerational mobility

1. INTRODUCTION

This paper proposes the first comparative measurement and analysis of intergenerational occupational mobility in five countries of Sub-Saharan Africa: Côte d'Ivoire, Ghana, Guinea, Madagascar, and Uganda. It reveals striking international differences in the intergenerational transitions between the farm and

Note: The authors thank Victor Hiller for his participation in the first stage of this study, Laure Pasquier-Doumer and Constance Torelli for their contributions in the construction of datasets, and Rachel B. Trichler for a thorough proofreading of the paper. Support from the Agence Française de Développement (AFD) is gratefully acknowledged. They also thank the World Bank and the National Statistical Institutes from Côte d'Ivoire, Ghana, Guinea, Madagascar, and Uganda for making the data available for this research. Seminar and conference participants at Cerdi, Dial, CSAE-Oxford, Paris School of Economics, and IARIW provided very useful comments, in particular Gareth Austin, Jérôme Bourdieu, Stefan Dercon, and Eric Maurin. The same is true of two anonymous referees and of Stephan Klasen, the editor. The usual disclaimer applies.

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non-farm sectors. Then it focuses on the explanation of these differences between countries, and shows that a story of differential spatial segregation of jobs can plausibly account for most of them.

On the economics side, the paper refers to the classics on development and structural change (e.g., Syrquin, 1988; Foster and Rosenzweig, 2008), and of course to the literature on intergenerational transmission of capital and income (Piketty, 2000; Solon, 2002). However, the analytical methods used here rather mirror those of the groundbreaking Erikson and Goldthorpe (1992) study and associated sociological works on comparative stratification research.

These works rarely go beyond the set of Western industrialized countries in the second half of the twentieth century, or else mostly include former-socialist European ones; low-income, developing or subtropical countries enter the comparative databases with unrepresentative surveys, which are often restricted to urban areas or specific regions (see, e.g., Tyree *et al.*, 1979; Grusky and Hauser, 1984; Ganzeboom *et al.*, 1989).[1] Some consensus has been reached on the long-term persistence of excess immobility, differences between countries and changes across time being only of second order, and access to education playing a central role (Treiman and Ganzeboom, 2000). For the more remote past, quantitative historical studies of intergenerational mobility are not many, one salient exception being Bourdieu *et al.* (2009), showing that the U.S. mobility level was initially high but went down and converged with the French one across the nineteenth and twentieth centuries. They interestingly attribute this convergence to increasing access to education in France and declining returns to migration in the U.S. In this paper we also look at education on the one hand, and at the differential access to job opportunities according to geographical location on the other hand.

The present work is made possible by the availability of large-sample surveys built upon a common methodology and providing information on the social origins of adult individuals. We use a set of 12 surveys that were implemented during a period ranging from the mid-1980s to 2005. Even today, only few large-sample nationally representative surveys ask about the parental background of adult respondents in developing countries. Behrman *et al.* (2004) could only find four Latin American countries where this kind of data had been collected on a comparable basis. The case of Brazil has been particularly investigated by sociologists and economists (e.g., Pastore, 1982; Bourguignon *et al.*, 2007; Dunn, 2007; Cogneau and Gignoux, 2008). Chile, the most industrialized country in this sub-continent, is also the subject of a single-country case study (Torche, 2005). Asia is not well documented, except recently for China (Cheng and Dai, 1995; Wu and Treiman, 2007), India (Kumar *et al.*, 2002a, 2002b), and Nepal and Vietnam (Emran and Shilpi, 2011). As for Africa, only South Africa has yet been investigated in this dimension (Lam, 1999; Louw *et al.*, 2007). Generally speaking, the aforementioned references first describe intergenerational occupational mobility in the country under review, as we do for our five countries, and subsequently try to address the role of education and of labor market features (discrimination, restrictions to migration like the *hukou* system in China, etc.). Behrman *et al.* (2004)

[1]Apart from representativeness, comparability of occupational variables is also an issue (Goldthorpe, 1985).

focus on intergenerational mobility in schooling attainments and do little to explore differences in occupational mobility. Likewise, Emran and Shilpi (2011) focus on gender differences (father–mother and daughter–son) and leave for further research the explanation of the differences they reveal between Nepal and Vietnam.

We focus on the intergenerational occupational mobility between agriculture and the non-agricultural sector. This two-sector divide is of considerable importance in the context of Africa. While the majority of the population lives in rural areas and derives its income from agricultural activities, the urban population has been rapidly growing over the second half of the twentieth century. In the 1970s and 1980s, the pace of urbanization in Africa was the highest in the world (Hope, 1998). More than a third of the population in Sub-Saharan Africa lived in cities in 2003. This structural change started at the beginning of the twentieth century, and the gap between the rural and urban worlds shaped migration flows and aspirations (Gugler, 1996).[2] Measurement issues also drive the choice of focusing on the mobility between farm and non-farm occupations. Delineating the seven-class categories commonly used for industrialized countries is difficult with the data at hand, and involves making assumptions that would render between-country comparisons unreliable.[3]

This paper makes four main contributions. It provides the first measurement of intergenerational mobility in little studied African countries, and reveals a large heterogeneity across countries. Second, we provide an interpretative framework for the levels of mobility flows and make the link with structural determinants through a migration model. Third, we identify two determinants of the between-country differences in net mobility: educational mobility, which mostly accounts for part of the rigidity in Madagascar; and more importantly the spatial dualism of employment, which could plausibly account for most of the sizeable differences between the other four countries. Finally, we tentatively argue that this latter characteristic is a legacy of different colonial administrations. This feature adds to other channels for colonial legacy already found in the literature, i.e. educational models, wage setting, and political centralization.[4]

The remainder of the paper is organized as follows. In Section 2, we propose a simple theoretical model that relates intergenerational flows between the farm and non-farm sectors to the size of each sector, unemployment, income differentials, and the effect of having a father farmer. The model yields a set of hypotheses for explaining the differences in intergenerational mobility. Section 3 presents the data used in the analysis and discusses measurement issues and methodological

[2]In contrast with part of the literature, we do not equate structural change with industrialization. In Africa, the shift to non-farm employment was mainly toward the service sector, either formal or informal (see, e.g., Jedwab (2011) on the impact of cocoa output growth on urbanization in Côte d'Ivoire and Ghana).

[3]We could however examine differences between countries in the intergenerational mobility between sub-segments of the non-farm sector: non-wage jobs (mainly informal self-employment) vs. wage jobs, and private vs. public sector jobs within wage jobs. Those differences appeared to be small, which further motivated us to focus on the farm/non-farm transition.

[4]Lower dualism, both in labor income and in employment, and higher intergenerational mobility can explain why Ghana and Uganda, compared to the three other countries, exhibit lower cross-sectional inequality as well as lower inequality of opportunity for income (Cogneau and Mesplé-Somps, 2008).

choices. In Section 4, we provide a measure of mobility flows and use the results of the model to investigate their determinants. A large share of these flows can be related to the pace of structural change, in particular the creation of non-farm jobs, and also correlated with the levels of income dualism between the two sectors. Section 5 then establishes a measurement of intergenerational *net mobility*, i.e. with change in occupational structure across generations netted out. Among our five countries, three groups appear: Ghana and Uganda are the most fluid societies, Côte d'Ivoire and Guinea are significantly more rigid, and Madagascar displays a particularly high reproduction of occupations. We also put those five countries in international perspective. Then we use logit models to examine which regressors absorb between-country differences in the estimates of intergenerational reproduction. While education accounts for a large share of the rigidity in Madagascar, it does not explain the differences between other countries. However, the spatial allocation of jobs, particularly among rural and urban areas, varies significantly across countries and accounts for the differences in intergenerational mobility. Section 6 discusses to what extent the contrasted patterns of social mobility in the five countries can be ascribed to a colonial legacy. Section 7 concludes.

2. Structural and Net Mobility, Migration, and Employment

What determines the intergenerational flows between the farm and the non-farm sector? One aspect is related to changes in economic structures. If the share of farm labor decreases over time, there are bound to be individuals working in the non-farm sector whose fathers worked (or still work) in the farm sector. This is what we call *structural*, or *gross* mobility. Another conceptually different aspect corresponds to intergenerational mobility that does not depend on structural change. Even if the shares of farm and non-farm labor were constant in the economy, there would be intergenerational movements between these two sectors. This corresponds to *net* mobility.

A simple migration model, inspired from the Harris and Todaro (1970) framework, can provide an understanding of the determinants of mobility. Two sectors are distinguished, farm and non-farm. In the farm sector, worker i can expect to receive earnings Y_i:

$$\ln Y_i = \ln y_c + y_i \quad \text{with } Ey_i = 0, \tag{1}$$

where y_c is average farm earnings in country c, and y_i an idiosyncratic component that expresses individual i deviation from the country mean in terms of efficient units of labor (possibly augmented by land and capital owned or rented in).

In the non-farm sector, worker i can expect to receive the wage W_i:

$$\ln W_i = \ln w_c + w_i \quad \text{with } Ew_i = 0, \tag{2}$$

where w_c is average non-farm earnings in country c, and w_i the individual deviation from the country mean. As non-farm earnings are downwardly rigid, either for efficiency considerations or because wages are administered, non-farm jobs are rationed and the labor market does not clear; unemployment prevails in the form of a queue for non-farm jobs. The unemployment rate is u_c.

Individuals face relative entry costs K_i into the non-farm sector:

$$\ln K_i = \ln k_c + b_c F_i + k_i \quad \text{with } Ek_i = 0. \tag{3}$$

F_i is a dummy for the father being a farmer, with $b_c > 0$: we assume that the farmers' sons face higher barriers of entry, for instance lower education or additional migration costs. The farmer effect expresses how much more difficult it is for farmers' sons to access non-farm jobs (relative to farm jobs) compared to non-farmers' sons. k_c stands for country specific average migration costs and barriers of entry into the non-farm sector (for non-farmers' sons), other than queuing unemployment. To some extent, this relative cost of entry is close in spirit to Fields' (1975) extension of the Harris and Todaro model, although in an intergenerational setting.

When making sector choices, workers compare expected benefits and costs; they choose the farm sector if and only if:

$$\ln Y_i > \ln(1-u_c) + \ln W_i - \ln K_i \tag{4}$$

$$\text{i.e.:} \quad \ln y_c - \ln(1-u_c) - \ln w_c + \ln k_c - b_c F_i > w_i - k_i - y_i. \tag{5}$$

Call $e_i = w_i - k_i - y_i$ and Φ the c.d.f. of e_i. Call $z_c = w_c/y_c k_c$, the cost corrected earnings ratio. Then the share of farmers' sons staying in the farm sector reads:[5]

$$\Psi_1 = \Phi(-\ln(1-u_c) - \ln z_c - b_c). \tag{6}$$

The share of non-farmers' sons choosing the farm sector reads:

$$\Psi_2 = \Phi(-\ln(1-u_c) - \ln z_c). \tag{7}$$

For a given level of unemployment, lower barriers of entry and/or a higher earnings dualism will make more farmers' sons exit the farm sector, and more non-farmers' sons stay in the non-farm sector.

In this framework with heterogeneous workers, an implicit function determines the unemployment rate. If p is the share of farmers' sons (assuming the same share initially in all countries) and λ_c the (exogenously set) share of non-farm employment in total labor:

$$p \cdot (1-\Psi_1) + (1-p) \cdot (1-\Psi_2) = \lambda_c/(1-u_c). \tag{8}$$

That we can rewrite:

$$\Theta(u_c, z_c, b_c) = \lambda_c. \tag{9}$$

[5]We here assume that e_i is independent from father's occupation. In the empirical part, we only argue that selection effects stemming from the correlation of $w_i - y_i$ with F_i are similar across countries; we checked in particular that the father farmer dummy has the same (negative) impact on log-wages in each country. See Section 5.

$\partial\Theta/\partial u_c < 0$, hence u_c is straightforwardly decreasing with λ_c. Likewise $\partial\Theta/\partial z_c > 0$, hence $\partial u_c/\partial z_c = -(\partial\Theta/\partial z_c)/(\partial\Theta/\partial u_c) > 0$. u_c is increasing in w_c, as in the standard Harris and Todaro model.[6]

The model first indicates that with lower barriers of entry (or higher non-farm earnings), more farmers' sons get out from the farm sector, and less non-farmers' sons get back to the farm sector; second, unemployment increases. Lastly, with higher employment in the non-farm sector, more farmers' sons leave the farm sector, less non-farmers' sons enter the farm sector, and unemployment decreases. Hence a combination of higher non-farm employment with lower barriers of entry or higher wages has a non-ambiguous effect on structural mobility flows, but a more ambiguous impact on unemployment.[7]

Hereafter, we will measure net mobility (after canceling out the effect of structural change) by the odds-ratio of the farm/non-farm alternative for farmer/non-farmer sons, i.e.:

$$\mathrm{OR}_c = [(1-\Psi_2)/\Psi_2]/[(1-\Psi_1)/\Psi_1]. \tag{10}$$

Section 3 provides more details on the construction and interpretation of odds-ratios. In the general case, mobility costs b_c could interact with the features of structural change (z_c and λ_c) and differences in odds-ratios between countries could depend on the shape of the function Φ. One exception is when Φ is logistic, i.e. $\Phi(x) = 1/(1 + \exp(-x))$; the odds-ratio then simply reads:

$$\mathrm{OR}_c = \exp(b_c) \tag{11}$$

and thus is independent of wage dualism and of the level of non-farm employment. All these variables only impact the structural mobility component. In that case, to explain differences in b_c we must resort to the additional mobility costs that are faced by farmers' sons compared to non-farmers' sons. These costs can be mere transportation or information costs; they can also stem from the need to acquire specific skills through education. Spatial dualism of employment can also generate a bias in the distribution of costs: if non-farm jobs are more often located in cities in country c compared to c', non-farmers' sons are closer to non-farm job offers and enjoy a lower duration of unemployment or lower mobility costs.

Of course, the real world labor markets are a bit more complex. In particular, only the formal part of the non-farm sector can be assumed to display exogenous employment and wage rate, driven by taxation of natural resources revenue and by foreign capital inflows. However, the informal part can be treated as another form of unemployment, for those individuals who cannot afford long unemployment durations (as in Fields, 1975).

[6]Like unemployment, agricultural prices, hence farm earnings, cannot be deemed exogenous from migration decisions. In Harris and Todaro (1970), the relative price of agriculture (included in y_c) is determined by the product market equilibrium. The structural transformation can increase y_c as urban demand grows faster than agricultural supply. A given increase in w_c or decrease in k_c would then translate in a lower increase in z_c. Yet partial equilibrium on the non-farm labor market is enough to our matter. Fields (1975) has the same argument (p. 168, footnote 8).

[7]A more elaborate model could take into account duration of unemployment, like in Stiglitz (1974). By decreasing the expected duration of unemployment, a higher growth momentum in the non-farm sector can generate a transitory increase of unemployment.

With that latter qualification, the model provides a few simple, testable hypotheses on the determinants of both structural and net mobility:

(1) In countries with high growth rates of employment in the public or private wage sector, more and more farmers' sons exit the farm sector, while fewer non-farmers' sons turn to the farm sector; this effect is reinforced by a high level of wage dualism. Conversely, in countries where structural change is more limited, whether in terms of employment or of wages, there are also more movements out of the non-farm sector toward agriculture. Hence both kinds of countries could exhibit rather similar shares of movers.
(2) Once differences in mobility linked to structural change have been netted out, differences in net mobility can be attributed to differences in mobility costs between farmers' sons and non-farmers' sons, stemming from education, spatial dualism in the distribution of wage jobs offers, or other factors.

3. Measurement Issues and Methodological Choices

Data and Selection of Countries

We use national household surveys that were carried out in Côte d'Ivoire, Ghana, Guinea, Madagascar, and Uganda between 1985 and 2006. The Côte d'Ivoire (four waves), Ghana (five waves), and Madagascar surveys are "integrated" Living Standard Measurement Surveys (LSMS) designed by the World Bank in the 1980s; the format of the two others for Guinea and Uganda is inspired from them. Online Appendix A gives the exact names and sample sizes of these surveys. Our data source investigation revealed that they count among the very few nationally representative surveys in Sub-Saharan Africa that provide information on parental background for adult respondents (with the exception of already well-documented South Africa). The selection of the five countries of our study was guided by the availability of data. It is however worth noting that they have many characteristics in common. As with all Sub-Saharan countries, they derive most of their trade income from agricultural and/or mineral exports. Within the region, the five countries are all of average size. Further, when computed over arable land, population densities are quite close (online Appendix B). The bulk of the labor force is still working in agriculture, although there is some variation between the most urbanized country, Côte d'Ivoire, and the most rural, Madagascar. The vast majority of agricultural workers are small landowners or sharecroppers.

Analytical Methods: Odds-Ratios and Logit Model

As it is now traditional in quantitative sociology, we measure net mobility by computing odds-ratios from mobility tables crossing sons' and fathers' occupation or education, and we analyze them with logit models. Odds-ratios make it possible to compare the strength of association between origin and destination across time and space, regardless of the fact that the weight of some destinations varies between countries or periods. More precisely, the odds-ratio expresses the relative

odds for two individuals of different origins to reach a specific destination rather than another one.

Let $i = 0,1$ and $j = 0,1$ index the two origins and the two destinations of a 2 rows and 2 columns mobility table; let n_{ij} be the number of individuals of origin $x = i$ and destination $y = j$, and $p_{ij} = p(y = j|x = i)$ the conditional probability of reaching destination j for origin i.

The odds-ratio of this table is defined as:

$$\text{OR} = \frac{n_{11}/n_{10}}{n_{01}/n_{00}} = \frac{p_{11}/(1-p_{11})}{p_{01}/(1-p_{01})}. \tag{12}$$

In our case, we will focus on odds-ratios defined as:

$$\text{OR} = \frac{p(y = \text{non-farmer}|x = \text{non-farmer})/p(y = \text{farmer}|x = \text{non-farmer})}{p(y = \text{non-farmer}|x = \text{farmer})/p(y = \text{farmer}|x = \text{farmer})}. \tag{13}$$

The numerator of equation (13) can be read as the odds of becoming non-farmer rather than farmer for a non-farmers' son; the denominator is the same but for a farmer's son.[8] If non-farmers' sons are four times more likely to become non-farmers than farmers, and farmers' sons are two times more likely to become farmers than non-farmers, the odds-ratio will be $8 = 4/0.5$. Imagine that the non-farm sector expands quickly, and the odds of becoming non-farmer relative to farmer double for both farmers' sons and non-farmers' sons. The odds-ratio would remain the same: $8 = 8/1$. This is why looking at odds-ratios can cancel out the impact of structural change: while conditional probabilities are constrained by the margins of the mobility table, the odds-ratio is not.

The logit model expresses the natural logarithm of odds-ratios as a linear function of more than one correlate:

$$\ln \frac{p(y = 1|X)}{1 - p(y = 1|X)} = \alpha + X\beta \tag{14}$$

where y still indexes the occupational or educational destination. X is a vector of observed variables x (parental background, education, etc.). β is a vector of parameters. α is a constant that stands for the odds of the "reference group" (all $x = 0$ within X), i.e. the denominator of (12) in the univariate (only one variable of origin x) and dichotomous ($x = 0$ or 1) cases. All models are estimated on the full sample pooled from all countries with variables interacted with country dummies, which allows a straightforward computation of chi-square tests for between-country differences in the estimated coefficients. Regressions also include country specific birth cohort fixed effects, to account for structural change in the distribution of occupations or education.

[8]The odds-ratio can also be given another reading: for two sons taken randomly, one with a non-farmer father and the other with farmer father, the odds-ratio is the ratio of the probability that both sons reproduce their father's occupation over the probability that both of them do not reproduce.

Measurement of Occupation

We focus on the intergenerational reproduction of agricultural vs. non-agricultural occupations. The measurement of this variable is homogenous across all surveys. For the respondent, "agriculture" or "farm" corresponds to the main occupation over the past 12 months being agriculture, husbandry, or fishing. Then "non-farm" encompasses all other occupations, including self-employed occupations in the informal sector, in urban as well as rural areas. We do not present results on wage jobs vs. self-employment among non-agricultural workers. However, we checked that international differences in intergenerational mobility patterns really lie in the farm/non-farm dichotomous occupational choice, and not, for instance, in the wage/non-wage distinction: in each country we observed that the father farmer variable had no significant impact on son's access to wage jobs rather than self-employment, or to civil service positions compared to private jobs. For the fathers, occupation is reported by the son as the one the father had "for most of his life"; the items only allow separating agricultural occupations from non-agricultural ones. Finally, because of the increasing diversification of farm and non-farm activities (Rigg, 2006), we also use information available on the secondary occupation of the respondents. For that we use a section present in all surveys which consistently collects information on the job the respondent "spent the most time on" after his main job.

Inactivity and Unemployment

Occupational mobility of women presents different features and determinants. Women have more frequent periods of inactivity and intergenerational mobility patterns have been shown to differ for men and women in many contexts (e.g., Hout, 1988). As is common in this literature, this paper therefore focuses on men.

Male respondents may still declare that they were inactive or unemployed in the past 12 months, so that not all sons' occupations can be classified as agricultural or non-agricultural. As the employment rates vary across age groups and also across countries (see upper panel of Table 1), not taking non-employment into account could introduce bias in our comparisons. For the sake of space and simplicity, our main results exclude non-employed individuals. However, we implemented a few robustness checks to ascertain the validity of our results (available on request). First, we restrict our main analysis to the cohorts born before 1960 and exclude the cohort born in 1960–69 which has the highest rates of non-employment (Table 1); however, we checked that results are very similar when including this youngest cohort. Second, we also estimated multinomial logit models of occupational choice with non-employment as a third option. Third, we looked at the sensitivity of the results to the recoding of non-employed as either agricultural or non-agricultural workers. In each country and within each age group, the profile of the non-employed is in fact very close to that of non-farm workers, whether in terms of father's occupation, education, place of birth or place of residence. In line with our model, this motivates us to interpret non-employment as queuing unemployment. Indeed, recoding the inactive and unemployed as

TABLE 1
Occupational Structures for Each Country and Cohort

Birth Cohort	1930–39	1940–49	1950–59	1960–69
% not employed				
Côte d'Ivoire	5.9	2.0	7.8	22.8
Ghana	6.8	2.6	2.3	5.7
Guinea	10.0	2.9	3.8	11.9
Madagascar	5.0	1.6	0.8	3.8
Uganda	6.9	2.9	2.1	6.0
% in agriculture (among employed)				
Côte d'Ivoire	72.2	53.3	42.2	51.2
Ghana	67.4	55.6	54.3	54.4
Guinea	79.1	65.5	54.3	57.0
Madagascar	85.0	71.5	70.7	75.6
Uganda	81.3	70.0	66.9	64.2
% in non-wage non-farm				
Côte d'Ivoire	11.0	13.9	13.3	15.9
Ghana	9.8	12.5	15.6	19.2
Guinea	14.9	20.5	23.9	33.3
Madagascar	4.8	9.6	8.7	12.8
Uganda	5.4	9.3	11.6	13.0
% in wage non-government				
Côte d'Ivoire	10.2	19.3	26.2	22.5
Ghana	9.5	13.0	14.9	16.8
Guinea	4.3	8.0	12.1	8.3
Madagascar	6.0	10.0	10.4	8.5
Uganda	6.6	10.2	11.3	14.2
% in civil service				
Côte d'Ivoire	6.5	13.5	18.3	10.3
Ghana	13.3	18.9	15.2	9.6
Guinea	1.7	6.0	9.7	1.3
Madagascar	4.2	9.0	10.2	3.1
Uganda	6.7	10.5	10.2	8.5

Coverage: Men aged 25–69 born between 1930 and 1969.

"non-farm" causes negligible changes to the country figures of intergenerational mobility.

Intra-Generational Mobility Over the Life-Cycle

Given the cross-sectional nature of our data, we use different cohorts of respondents in order to analyze the evolution of occupational structures and their reproduction over time. However, it is likely that age has a non-neutral effect on occupational attainments, hence canceling out the effect of intra-generational mobility is important for the robustness of our results. To do so, we take advantage of a survey section on employment history, available in all surveys except in Uganda and in the last two of five surveys in Ghana. The section includes questions on the time spent in the current occupation and in the respondent's previous jobs. For all individuals of at least 35 years of age, this makes it possible to reconstruct the occupational status at age 35, and to check the sensitivity of our analyses to canceling out intra-generational mobility (see Section 4). Since there is no employment history for the fathers, we can only apply this sensitivity check to the destination variable.

4. Intergenerational Mobility Flows and Structural Change

The period under study is one of rapid structural change which saw the decline of farm activities as a share of total jobs. However, the pattern and the pace of this structural change vary across countries, and will then impact the levels of intergenerational mobility flows. These differences provide the opportunity to observe the correlation between structural change and levels of intergenerational mobility, and thereby test the relevance of our model. The variation across countries corresponds to large differences in growth rates, with a rapid economic expansion until the end of the 1980s in Cote d'Ivoire and Guinea driven by commodity booms, while the other countries stagnated or even experienced a fall in income per capita over the period (online Appendix B).

Table 1 presents the evolution in the job structures across cohorts for each country. There is a steady decline in the share of men working in agriculture across cohorts in all countries. In the oldest cohort (1930–39), the share of farmers varies between 67.4 percent (Ghana) and 85.0 percent (Madagascar). In the 1950–59 cohort, it ranges between 42.2 (Côte d'Ivoire) and 70.7 percent (Madagascar), which reflects a dramatic decrease. As we obtain very similar figures when we cancel out life-cycle mobility by using the reconstructed occupation at age 35 (see Section 3), we can safely interpret those figures as structural change across generations. The last cohort shows a reversal of the trend, which might correspond to a slowdown in the pace of non-farm job creation but also to the fact that those individuals are still young at the time of the surveys (late 20s or early 30s). Since career entry generally happens later in the non-farm sector because of queuing effects, the last cohort is overrepresented in the farm sector and in non-employment (see upper panel of Table 1).

Although the general trend of structural change is similar across countries, its pace varies widely. The decline is much more rapid in Côte d'Ivoire (–42 percent) and Guinea (–31 percent) than in the other three countries (less than –20 percent). As shown in the lower panels of Table 1, this difference is due to a massive increase in wage jobs in Côte d'Ivoire and Guinea, be it in the private sector or in the government. These differences might impact the relative levels of structural mobility.

The model also involves income differentials between sectors. A large earnings gap generates intergenerational movements out of the farm sector and deters movements out of the non-farm sector. Table 2 reports some measures of earnings dualism. Individual non-wage earnings are very imperfectly reported in surveys. Individualized farm income is not recorded at all in Guinea and Madagascar, and non-farm benefits are only partially available in Madagascar. In order to compare our five countries, we therefore use the value added per worker in agriculture drawn from national accounts instead of agricultural income (first three columns of Table 2). For the countries where data are available (Côte d'Ivoire, Ghana, and Uganda), we use survey data and relate average annual earnings reported by non-farmers, whether from wages or from benefits, to average annual earnings reported by farmers (last column of Table 2). Despite potentially large errors, both measurements reveal striking differences between Côte d'Ivoire, Guinea, and Madagascar where the gap between farm and non-farm earnings is large (fourfold to tenfold), and Ghana and Uganda where it is much lower (less than threefold).

TABLE 2
Wage Levels and Income Dualism

	(A) Value Added per Worker in Agriculture 1990 (US$)	(B) Mean Annual Real Wage (1990 US$ and prices)	Ratio (B)/(A)	(C) Survey-Based Ratio of Annual Earnings: Non-Farm to Farm
Côte d'Ivoire	1,298	5,145	4.0	6.4
Ghana 1987–92[a]	728	750	1.0	2.8
Guinea	260	1,712	6.6	–
Madagascar	199	2,041	10.2	–
Uganda	343	534	1.5	1.6

Coverage: Men aged 25–69 born between 1930 and 1969 and employed.

Notes: Columns B and C are survey estimates. In the Côte d'Ivoire, Ghana and Uganda surveys, more than 89 percent of employed individuals declare their labor earnings, whether they are wages or benefits, and whatever their occupation. In the Guinea and Madagascar surveys, only wage earners declare individual earnings, so that we cannot compute the column C ratio in their case. As respondents declare earnings for a given time unit (hour, day, week, month . . .), they are translated into annual earnings assuming 200 hours and 25 days of work in a month. Last, they are deflated by the consumer price index with 1990 as base year and translated in US dollars using the 1990 exchange rates. All earnings distributions are trimmed: observations whose logarithm of earnings lies 3 standard deviations above or below the median of log-wages are discarded. "Wages" (column B) are earnings received in their main occupation by salaried workers in government or army, public or private companies or businesses, outside of the agricultural sector.

[a]In order to have earnings measurements which are not too far from the chosen benchmark year 1990, we here exclude the 1998 and 2006 Ghana surveys.

Source: World Development Indicators 2011 for value added per worker in agriculture (column A).

Having looked at the patterns of employment and earnings, we now ask whether country differences in intergenerational mobility flows are consistent with the predictions of our migration model.

The upper panel of Table 3 displays levels of intergenerational mobility flows for all five countries and each birth cohort. Please note that in the remainder of this paper structural change is reflected in sons' occupation compared to fathers', rather than in the mere changes of occupational structures across birth cohorts as in Table 1. Table 3 first reveals a large and rapid intergenerational transition to the non-farm sector in Côte d'Ivoire and Guinea for cohorts born until the end-1950s. In both countries, the share of farmers' sons working in the non-farm sector doubles. Madagascar also displays a rapid increase, but the share stabilizes at a much lower level than in the other countries (less than 20 percent). Ghana and Uganda experience a slower transition. The upper panel of Table 3 then shows the share of non-farmers' sons who stay in the non-farm sector. In Côte d'Ivoire, Guinea, and Madagascar, this share is above 80 percent (the last cohort in Madagascar being an exception). In Ghana and Uganda, a larger proportion of non-farmers' sons engage in farm activities as their main job.

The differences in structural change and income dualism and the levels of intergenerational mobility flows are consistent with the predictions of the model. In countries where the share of non-farm employment grows, mobility toward the non-farm sector also grows while the sons of non-farmers remain in the non-farm sector. Earnings dualism also explains those differences.

TABLE 3

Mobility and Structural Change

Birth Year Cohorts:	1930–39	1940–49	1950–59	1960–69	1930–39	1940–49	1950–59	1960–69
	Conditional Probability (%): Farmers' Sons Become Non-Farmers				Conditional Probability (%): Non-Farmers Sons Stay Non-Farmers			
Côte d'Ivoire	25	41	51	36	69	88	89	93
Ghana	25	34	36	31	63	70	72	73
Guinea	17	28	35	30	44	77	82	89
Madagascar	9	18	19	13	68	81	83	69
Uganda	16	23	26	28	33	59	60	61
	Share of Movers (%)				"Net Mobility": Share – Minimum Share (%)			
Côte d'Ivoire	25	37	44	30	4	3	4	3
Ghana	27	34	34	30	14	12	15	19
Guinea	22	27	31	25	14	6	8	4
Madagascar	11	18	18	16	7	6	5	13
Uganda	23	27	29	31	18	16	16	19

Coverage: Men aged 25–69 born between 1930 and 1969 and employed.

Notes: Let us focus on the older cohort (born in 1930–39). The top panel shows that 25% of farmers' sons have a non-agricultural occupation in Côte d'Ivoire, against 69% of non-farmers' sons. In the bottom panel, 25% of individuals have a different occupation than their father (either farmers' sons being non-farmers or non-farmers' sons being farmers). If all non-farmers' sons would have stayed non-farmers, and hence only the minimum number of farmers' sons had moved to non-farm due to structural change (i.e., changes in the occupational structure between the generation of fathers and the generation of sons), this share of movers would be only 21%, this pointing to a 4 percentage points difference between the observed share of movers and the minimal share ("net mobility").

As shown in the bottom panel of Table 3, the aggregate share of movers appears fairly similar across countries, with the exception of Madagascar which again appears more rigid. As we observed, the nature of those intergenerational movements varies. In countries where structural change and income dualism are important, transitions to the non-farm sector make up most of the intergenerational movement. When structural change is slower and income dualism is limited, flows out of the non-farm sector may be as important as flows into the non-farm sector.

It is therefore critical to investigate the determinants of social mobility beyond the impact of structural change. We highlight this point in Table 3 (right part of the bottom panel) by providing a first attempt to net out the impact of structural change in occupational structures. We first calculate the minimum movements triggered by the mere change in job structures in the economy. This minimum corresponds to the case where all non-farmers' sons stay non-farmers and the intergenerational movements therefore only reflect the transition toward less agriculture. We then report the difference between the share of movers we observe and the minimum share. The levels of net mobility clearly separate Côte d'Ivoire, Guinea, and Madagascar on the one hand, and Ghana and Uganda on the other hand. In the first three countries, the total mobility is hardly higher than what structural change mechanically generates (around 5 percentage points). In Ghana and Uganda, a large share of movements (15 to 20 percentage points) is left unexplained by structural change. This calculation shows that the levels of "net

mobility" might differ largely across countries, and be quite different from "gross" mobility flows.

In the next section we focus on net, or exchange, mobility. We provide a refined assessment of the level of net mobility in each country, put it in international perspective, and examine how differences in educational mobility and spatial dualism of employment (and related migration costs) may account for between-country differences.

5. Net Mobility, Education, and Spatial Dualism of Employment

We first construct (2,2) mobility tables crossing occupational origin (i.e., father being a farmer or not) and destination (i.e., son being a farmer or not). The odds-ratios for each decennial birth cohort are reported in Table 4.

Results reveal noticeable differences between countries. In Ghana and Uganda the odds-ratios remain relatively low and quite stable across time. In all cohorts the son of a farmer and the son of a non-farmer are "only" 3 to 6 times more likely to reproduce their fathers' positions than to change them. In sharp contrast, Côte d'Ivoire and Guinea display odds-ratios twice as high as in Ghana or Uganda for the 1940–49 and 1950–59 cohorts. Last, in Madagascar,

TABLE 4

Intergenerational Reproduction of Occupations: Farm/Non-Farm Odds-Ratios

Birth Year Cohorts:	1930–39	1940–49	1950–59	1960–69[a]
Current occupation				
Côte d'Ivoire	6.9	10.3	7.7	22.3
	[3.8; 12.6]	[5.5; 19.0]	[4.9; 12.2]	[8.6; 57.5]
Ghana	5.1	4.5	4.6	5.8
	[3.9; 6.6]	[3.6; 5.7]	[4.0; 5.3]	[5.0; 6.7]
Guinea	3.8	8.4	8.3	19.6
	[2.1; 6.6]	[5.0; 14.0]	[5.5; 12.6]	[12.7; 30.3]
Madagascar	22.6	20.3	21.4	15.5
	[11.9; 42.8]	[11.4; 36.1]	[14.9; 30.8]	[11.7; 20.5]
Uganda	2.5	4.7	4.2	4.0
	[1.7; 3.8]	[3.5; 6.4]	[3.3; 5.4]	[3.4; 4.8]
At age 35				
Côte d'Ivoire	7.8	8.9	11.0	–
	[4.1; 14.8]	[4.8; 16.7]	[3.3; 36.7]	–
Ghana[b]	5.8	4.4	3.7	–
	[4.0; 8.5]	[3.3; 5.9]	[2.7; 5.0]	–
Guinea	4.5	6.9	7.2	–
	[2.5; 8.3]	[4.2; 11.4]	[4.9; 10.7]	–
Madagascar	19.9	26.7	19.4	–
	[9.8; 40.5]	[12.9; 54.2]	[13.2; 28.6]	–

Coverage: Men born 1930–69 (aged 25–69 for current occupation, 35–69 for occupation at age 35) and employed.

Notes: In Côte d'Ivoire in the oldest cohort, it is 6.9 times more likely for the son of a farmer to be a farmer himself (relative to being a non-farmer) than for the son of a non-farmer (also relative to being a non-farmer); when taking instead their occupation at age 35, the same odds-ratio is 7.8.

Asymptotic confidence intervals at 5% indicated between brackets (delta-method).

[a]Côte d'Ivoire: born 1960–63 only. Madagascar: 1960–68. Uganda: 1960–67.

[b]The 1998 and 2005 surveys (GLSS 4 and 5) are not used here, for employment history is not available.

intergenerational reproduction remains at very high levels throughout the colonial and post-colonial eras, with odds-ratios always greater than 15.

In the last and youngest cohort (1960–69), intergenerational reproduction seems to double in Côte d'Ivoire and Guinea and gets closer to the level of Madagascar. Comparisons are admittedly difficult due to high rates of inactivity/unemployment in the former countries. Yet as mentioned earlier, coding all non-employed individuals as "non-farmers" brings very little change to the odds-ratio; as non-employed individuals share the same social profile as non-farm workers, it might reveal that they are mostly queuing for non-farm jobs. Yet, if some of them failed in their non-farm job search and eventually joined the farm sector, then the odds-ratio could have got down to the levels observed in former cohorts.

As explained in Section 3, intra-generational mobility may bias the results, but the survey sections on employment history allow a correction. When computing the same set of odds-ratios with occupations at 35 instead of current occupation, our results are hardly altered (bottom panel of Table 4). In the case of Ghana, the availability of five survey rounds covering the 1987–2005 period also allows testing for the change of odds-ratios across time, as cohorts get older. Such a test shows that odds-ratios remained stable across survey rounds for the 1930–59 birth cohorts, with values ranging between 4.6 and 5.7 and not significantly different from each other (result not shown, available on request).

By computing the same odds-ratios for the whole sample of men aged 20–69, we can draw some simple comparisons with other developing countries. As Table 5 shows, Côte d'Ivoire and Guinea share the same level of intergenerational reproduction of occupations as Brazil and South Africa, two countries well-known for their records in inequality, and China, where labor migrations are

TABLE 5

THE FIVE COUNTRIES COMPARED WITH BRAZIL, CHINA, INDIA, AND SOUTH AFRICA

	Farm/Non-Farm Odds-Ratio
Uganda 1992	4.1
Ghana 1987–2005	5.2
South Africa 2008	7.8
Brazil 1996	8.0
China 1996	8.6
Côte d'Ivoire 1985–88	10.0
Guinea 1994	10.1
Madagascar 1993	16.9
India 1996	32.4

Coverage: Men ages 20-69, except for India: representative sample of male electorate.

Source: Authors' computations either directly from survey data or from other authors' results. Brazil: direct computation from PNAD 1996 survey (see also Cogneau and Gignoux, 2008); China: from table 3 in Wu and Treiman (2006); India: from tables 2 and 3 in Kumar *et al*. (2002a, 2002b); South Africa: direct computation from the NIDS 2008 survey (Wave 1).

still strictly regulated (*hukou* system). Madagascar stands between this latter group of countries and India, whose caste system is precisely based on a stringent intergenerational reproduction of occupations. Although less prominent, caste-like structures also prevail in Madagascar and determine occupational attainments (Roubaud, 2000). In contrast, Uganda and Ghana stand out as much more fluid societies.

We now turn to potential explanatory factors for those differences in net mobility, i.e. in the coefficient b_c of the model. In the following, we first examine the impact of educational mobility, and then examine the impact of the geographical distribution of activities between rural and urban areas. Results tell that the latter factor could account for most of the differences across countries.

We are aware of the biases linked to treating education or location choices as exogenous from occupational choice. We do not claim strict exogeneity here, only that endogeneity biases could be more or less the same across countries. Indeed, regressing on these covariates is meant to account for international differences in the impact of the father farmer variable. This limited ambition means that we abstract from determinants whose correlation with both the father-farmer variable and son's occupation can be assumed similar between countries. However, we acknowledge that the evidence provided is still descriptive rather than causal. We only argue that the impacts of education and rural/urban location on international differences in farm/non-farm odds-ratio provide both suggestive and plausible pieces of evidence about the relevance of the educational and geographical mobility channels.

Education and Intergenerational Occupational Mobility

Since non-farm jobs generally require more formal education than farm jobs, the intergenerational transmission of education levels may be critical. For this to be the case, countries would have to differ in their level of intergenerational educational mobility, and those differences would reproduce the variations observed on occupational mobility. Our data allow us to estimate an ordered logit model that regresses the level of education of the son on the father's occupation and education (Table 6).[9] Madagascar stands out with a high intergenerational rigidity in educational attainments, if we take both the father being farmer and the father's level of education as the variable of origin. For the other four countries, even if we observe a high reproduction of education levels across generations, differences between them are small. There is a very significant impact of the father's farmer dummy variable, with odds-ratios around 3.5, but it is similar across countries. The result is the same if we consider the direct impact of the father's education (column 2).

How do these differences and similarities in educational mobility affect the patterns of occupational mobility? We estimate a logit model for intergenerational mobility in occupation that introduces education as a covariate. The univariate

[9]Following Cameron and Heckman (1998), we give our preference to an ordered logit over a sequential model where school enrolment, primary and secondary level completion would be analyzed separately and successively; selection across grades can indeed bias the coefficients of parental background. Still in our case a sequential model provides very similar conclusions.

TABLE 6
INTERGENERATIONAL BARRIERS IN SCHOOL ATTAINMENTS

	Son's Education			
	(1)		(2)	
	Odds-Ratio	S.E.	Odds-Ratio	S.E.
Father farmer				
Côte d'Ivoire	3.4	0.4	2.3	0.3
Ghana	3.5	0.2	1.9	0.1
Guinea	5.9	0.7	4.1	0.5
Madagascar	9.7	1.1	5.3	0.6
Uganda	3.5	0.3	2.2	0.2
Father never reached primary				
Côte d'Ivoire			3.1	0.7
Ghana			3.9	0.2
Guinea			5.4	1.0
Madagascar			9.3	1.5
Uganda			4.8	0.6
Father only reached primary				
Côte d'Ivoire			(0.8)	0.2
Ghana			1.3	0.1
Guinea			(0.9)	0.2
Madagascar			1.7	0.2
Uganda			1.6	0.2
Log. likelihood	−33,999		−32,890	
Pseudo-R^2	0.19		0.21	
N	31,327			

Coverage: Men aged 25–69 born between 1930 and 1969.

Notes: Ordered logit models for son's education (0: never went to school; 1: only reached primary level; 2: only reached secondary level; 3: reached tertiary level). Education level is written in reverse (decreasing) order: an odds-ratio higher that one means that the variable increases the odds for low education.

Omitted category for father's education: more than primary school.

The models include decennial cohorts' dummy variables for each country. Unless noticed by a parenthesis, all odds-ratios are significantly different from one at 5%; S.E.: standard errors, clustered by PSUs.

logit model in the left-hand panel of Table 7 reproduces the differences in odds-ratios analyzed in Table 4, except that they are averaged across the cohorts born between 1930 and 1959—as indicated in Section 3, in the remainder of this paper we disregard the youngest 1960–69 birth cohort. The right-hand panel then adds the son's education, and shows that the odds-ratio corresponding to the father farmer influence is reduced in all countries, but more significantly so in the case of Madagascar, where it falls from 21.3 to 9.7; it is even hardly different from Côte d'Ivoire, as the chi-square test shows in the bottom panel of Table 7. Otherwise, differences between countries persist. Côte d'Ivoire, Guinea, and Madagascar are clearly different from Ghana and Uganda, even after controlling for educational attainments.

The level of education does play a major role in determining the son's occupation, and seems to account for part of the difference between Madagascar and the other countries. Yet it does not absorb other between-country differences in the levels of intergenerational mobility between the farm and non-farm sectors.

TABLE 7

EXITS FROM AGRICULTURE AND EDUCATION

	Son Farmer			
	(1)		(2)	
	Odds-Ratio	S.E.	Odds-Ratio	S.E.
Father farmer				
Côte d'Ivoire	8.2	1.9	6.1	1.5
Ghana	4.6	0.3	3.3	0.2
Guinea	6.8	1.3	4.7	0.8
Madagascar	21.3	3.7	9.7	2.0
Uganda	4.1	0.5	2.7	0.3
Son never reached primary				
Côte d'Ivoire			67.6	30.9
Ghana			12.8	1.4
Guinea			21.4	6.3
Madagascar			97.2	38.8
Uganda			23.4	4.9
Son primary level only				
Côte d'Ivoire			35.3	16.0
Ghana			8.5	1.0
Guinea			10.8	3.3
Madagascar			32.8	11.6
Uganda			14.0	2.3
Son middle school level only				
Côte d'Ivoire			6.2	2.8
Ghana			4.4	0.4
Guinea			5.7	2.3
Madagascar			5.3	2.1
Uganda			6.3	1.3
N	20,089			
Log. likelihood	−11,794		−10,377	
Pseudo-R^2	0.11		0.22	
Tests of father farmer odds-ratio equality (prob > χ^2):				
C. d'Iv. = Ghana	0.017		0.020	
C. d'Iv. = Uganda	0.007		0.004	
Guinea = Ghana	0.048		0.073	
Guinea = Uganda	0.020		0.013	
C. d'Iv. = Madag.	0.001		0.150	
Guinea = Madag.	0.000		0.007	
C. d'Iv. = Guinea	0.549		0.393	
Ghana = Uganda	0.368		0.171	

Coverage: Men aged 25–69 born between 1930 and 1959 and employed.

Notes: Logit model for son working in agriculture; includes decennial cohorts' dummy variables for each country (coefficients not shown). Unless noticed by a parenthesis, all odds-ratios are significantly different from one at 5%; S.E.: standard errors, clustered by PSUs.

Spatial Dualism of Employment and Intergenerational Occupational Mobility

We therefore turn to a second possible dimension of the b_c coefficients, which is the differential migration costs due to different spatial distributions of non-farm activities. If farm and non-farm activities are geographically segregated across rural and urban areas, then having a father farmer implies that the son lives in a rural area, and accessing a non-farm job requires migration to a city. Conversely,

TABLE 8
Employment Structures and Spatial Dualism

	(1) Share of the Population Living in Rural Areas	(2) % of non-Farmers Among Workers in Rural Areas	(3) Share of civil Servant Employment in Rural Areas	(4) % of Non-Farmers with a Secondary Occupation in Agriculture (all areas)
Côte d'Ivoire	54.6	11.5	12.1	11.3
Ghana	64.5	23.6	41.4	33.9
Guinea	65.7	8.1	16.4	12.9
Madagascar	79.6	13.5	47.8	36.0
Uganda	87.2	20.4	72.5	40.0

Coverage: Men aged 25–69 born between 1930 and 1959.

if non-farm (resp. farm) activities are better represented in rural (resp. urban), having a father farmer does not necessarily imply that the son lives in a rural area, and non-farm jobs are available in rural areas, making costly migrations less necessary. The diversification of farm and non-farm activities, already shown to be an important determinant of economic resilience in rural areas (Jolliffe, 2004; Rigg, 2006; World Bank, 2008), may also impact intergenerational occupational mobility.

We do observe large variations across countries in the geographical distribution of non-farm activities, as shown in Table 8. In Ghana and Uganda, more than 20 percent of non-farmers work in rural areas, whereas the other three countries are below 15 percent (column 2). There is also a much higher share of public jobs in rural areas (column 3), with 40 percent in Ghana, a staggering 72 percent in Uganda, as opposed to 16 percent or less in Côte d'Ivoire or Guinea. Madagascar displays levels comparable to the former British colonies. It is worth noting that these differences do not at all mirror the ranking of countries based on urbanization rates, displayed in column 1. Finally, column 4 shows that more than a third of non-farmers have a secondary activity in agriculture in Ghana, Uganda, and Madagascar, whereas the share is around 10 percent in Côte d'Ivoire and Guinea. This clearly points to important differences in the distance between farm and non-farm activities, and therefore to different levels of barriers of entry for farmers' sons into the non-farm sector.

As the definition of "rural" and "urban" may vary from one country to another, we checked the validity of our results by adopting a homogeneous survey-based definition of rural/urban status, inspired from the Côte d'Ivoire population census rule: for all countries we coded survey clusters (primary sample units) as rural when more than 50 percent of 25–69 year-old men have agriculture as their main occupation, and as urban otherwise. The figures in Table 8 are not significantly altered. We also regressed the "work in agriculture" dummy variable on survey clusters fixed effects: the R-square of these regressions corresponds to the share of inter-cluster variance in the total variance, which measures the spatial concentration of farm and non-farm employment. We find that in Côte d'Ivoire and Guinea, the R-square reaches values as high as 0.75 and

0.78, respectively, 0.60 in Madagascar, against 0.56 and 0.51 only in Ghana and Uganda. We conclude that the differences in spatial dualism of employment identified in Table 8 are quite robust.

Do differences in employment dualism across countries account for differences in net mobility? We argue that having a father farmer determines that sons are born in rural areas to a much greater extent in countries where employment dualism is the most salient (in the generation of fathers here). Then, due to persisting differences in employment dualism in the generation of sons, being born in a rural area also determines that sons work as farmers to a much greater extent.

In the cases of Côte d'Ivoire and Ghana, and for surveys implemented before 1989, we were able to reconstruct the rural–urban status of sons' birthplace (city, large, medium or small town, large or small village[10]). As it is self-assessed for individuals who are not natives of their place of residence, measurement errors may be important. Yet, column 1 of Table 9 shows that the correlation between having a father farmer and being born in a rural area is much higher in Côte d'Ivoire than in Ghana. Column 2 then shows that controlling for the son's birthplace type in a model of son's current occupation strongly reduces the Côte d'Ivoire/Ghana difference in the influence of the father's occupation: from an 8.2/4.4 difference in odds-ratios (see Table 9 footnote), the gaps narrows to 5.2/3.6 and is no longer statistically significant.[11]

For countries other than Côte d'Ivoire and Ghana, the son's place of birth type is unfortunately not available. However, we may look at the impact of having a father farmer on the likelihood to *reside* in a rural area. Table 9, column 3 shows that having a father farmer determines that sons live in a rural area to a much greater extent in Côte d'Ivoire, Guinea, or Madagascar, compared to Ghana or Uganda. The statistical tests of coefficient equality (bottom panel) clearly show that countries are divided among two groups.

We then tentatively include the son's place of residence in the model for sons' occupational status (Table 9, column 4). Of course we do not argue for exogeneity here, as reverse causality is obvious. Yet, the result obtained can be seen as suggestive: international differences in the strength of the *intragenerational*

[10]These are the Ghanaian categories. In Côte d'Ivoire the number of items is different. We classified as urban places of birth: "city," and "large town" in Ghana; "*grande ville*" and "*petite ville*" in Côte d'Ivoire. For natives, the rural–urban status is derived from the census-based survey code (less than 30 percent of individuals still live in their place of birth in both countries). With these choices, among 25–69 year-old males in the 1930–59 birth cohorts, 22 percent are born in rural areas in Côte d'Ivoire, and 21 percent in Ghana. Results of Table 9 are very much the same if for Ghana we additionally treat "medium towns" as urban, shifting the proportion of sons born in urban areas to 33 percent. Let us notice that this self-assessed urbanization level could be biased by non-classical measurement errors, leading to the attenuation of its correlation with son's occupation or place of residence: non-farmers living in cities could underrate the size of their place of origin, and vice versa for farmers living in small villages.

[11]In a model not shown for the son's place of residence, both variables, i.e. father being a farmer and son being born in a rural area, have a significant impact on the son living in a rural area, however their impact differs little between the two countries: most of the difference between them lies in the intragenerational correlation between father's occupation and son's place of birth (i.e., for most fathers, their place of residence at the time of their son's birth).

TABLE 9

Exits from Agriculture and Rural–Urban Dualism

	(1) Son is Born in a Rural Area		(2) Son Farmer		(3) Son Lives in a Rural Area		(4) Son Farmer	
	Odds-Ratio	S.E.	Odds-Ratio	S.E.	Odds-Ratio	S.E.	Odds-Ratio	S.E.
Father farmer								
Côte d'Ivoire	8.1	1.5	5.2	1.3	8.1	1.7	3.1	0.7
Ghana	4.5	0.5	3.6	0.4	3.9	0.3	3.1	0.2
Guinea					5.8	1.0	4.1	0.9
Madagascar					9.0	1.7	14.2	2.9
Uganda					3.7	0.6	3.3	0.4
Son born in a rural area								
Côte d'Ivoire			4.0	0.6				
Ghana			2.5	0.3				
Son lives in a rural area								
Côte d'Ivoire							61.7	15.0
Ghana							9.1	0.9
Guinea							109.1	29.6
Madagascar							16.0	4.4
Uganda							29.7	4.8
N	5,885		5,885		20,089		20,089	
Log. likelihood	–2,755		–3,759		–10,947		–8,654	
Pseudo-R^2	0.09		0.12		0.12		0.35	
Tests of father farmer odds-ratio equality (prob > χ^2):								
C. d'Iv. = Ghana	0.010		0.158		0.001		0.957	
C. d'Iv. = Uganda					0.005		0.829	
Guinea = Ghana					0.037		0.252	
Guinea = Uganda					0.068		0.385	
C. d'Iv. = Madag.					0.702		0.000	
Guinea = Madag.					0.098		0.000	
C. d'Iv. = Guinea					0.245		0.382	
Ghana = Uganda					0.787		0.768	

Coverage: Men aged 25–69 born between 1930 and 1959 and employed. Col. (1) & (2): CILSS1-4 for Côte d'Ivoire and only GLSS1-2 for Ghana: in other surveys, the type of son's place of birth was not recorded.

Notes: Columns (1) and (3): Logit models for son's place of birth or place of residence. Columns (2) and (4): Logit models for son working in agriculture; models include decennial cohorts' dummy variables for each country (coefficients not shown). In the case of (2), father farmer's coefficients can be compared respectively to 8.2 (S.E. = 1.9) and 4.4 (0.5) when the son's place of birth variable is not controlled for (the p-value of the chi-square test is then 0.018). In the case of (4), father farmer's coefficients can be compared to those of Table 7, column (1), here when the son's place of residence is not controlled for.

Unless noticed by a parenthesis, all odds-ratios are significantly different from one at 5%; S.E.: standard errors, clustered by PSUs.

association between occupation and location again seem very effective for explaining international differences in *intergenerational* mobility. Chi-square tests show that conditional to rural/urban residence, international differences in farm/non-farm odds-ratios disappear in all countries except Madagascar. Compared to odds-ratios in Table 7 (column 1), farm/non-farm odds-ratios of Côte d'Ivoire and Guinea are halved, while those of Ghana and Uganda hardly change. Madagascar stands out with a persistent effect of the father being a farmer, in part due to the educational factor highlighted earlier in the paper, and also to idiosyncratic

features like the persistence of caste structures.[12] Spatial polarization of employment and related migration costs appear as a direct determinant of net intergenerational mobility. While differences in educational attainments only accounted for part of the rigidity in Madagascar, differences in spatial dualism seem to absorb the differences between all other countries.

6. Colonial Legacy and Social Mobility

Our analysis of intergenerational mobility has highlighted several of its determinants, such as the farm/non-farm wage gap, the extent of educational mobility, and the spatial distribution of farm and non-farm activities. We have also pointed to significant differences between former French and British colonies. In this section we discuss the historical evidence suggesting that the colonial period may indeed have played a role in shaping socio-economic structures and ultimately impacted the level of social mobility.

We emphasized in Section 4 that the levels of income dualism were very different between Côte d'Ivoire, Guinea, and Madagascar on the one hand, and Ghana and Uganda on the other. This seems to reflect differences in wage-setting mechanisms between former French and British colonies. Mingat and Suchaut (2000) report similar figures when looking at the ratio of teachers' wages to GDP per capita. The last two rows of the table in online Appendix C show that the difference was even more pronounced in the 1970s compared to the 1990s, i.e. before structural adjustment policies took place. We are not aware of similar comparative evidence about wage levels and income dualism in colonial Africa. However, French "assimilationism," i.e. the doctrine of getting a minority of educated Africans into French culture and citizenship, could have played a role here. After World War II, this doctrine was used particularly by labor unions to push the principle of "equal pay for equal work," especially within the civil service. According to Cooper (1996, pp. 407–31), these claims made French officials realize that the colonial system was becoming unaffordable. Income dualism lasted long after independence. The data show that Côte d'Ivoire, and to a lesser extent Guinea, have created a large number of high-wage jobs between 1960 and 1980. Even if British authorities were also facing similar, increasingly pressing claims at the end of the 1950s, British policy had always been "to emphasize instead that distinct communities had different notions of work and different reference points for salaries" (Cooper, 1996, p. 445). Although more research is certainly needed here, it is rather plausible that the setting of high wage standards in former French colonies is a legacy of the late colonial era.

A series of references in the historical, sociological, or economic literatures have already documented the British colonies' educational advantage (e.g.,

[12]Introducing education in the Table 9 column (4) model, as in Table 7, makes little change except for Madagascar, and this country still remains significantly above others in terms of occupational immobility. Besides, all the results of this paper survive to absorbing district of birth fixed effects, which can be done for all countries except Uganda. Results of Table 9 are also robust to including the unemployed in a multinomial logit specification, and in column (4) to using the above mentioned alternative survey-based definition of rural/urban status, or to analyzing separately father's occupation influence on rural and urban sub-samples.

Benavot and Riddle, 1988). This advantage is also visible in our survey data when comparing Côte d'Ivoire or Guinea with Ghana or Uganda. However, in our analysis differences in educational patterns only help explain part of the Madagascar exception. Besides, an omitted inheritable variable like caste, which is correlated with both educational and occupational attainments, could underlie the specific role of education in Madagascar (Roubaud, 2000).

Differences in the spatial distribution of activities might also reflect a colonial legacy. The importance of rural–urban dualism rose rapidly over the early twentieth century, when colonial powers established European-like administrative structures and European firms initiated the development of a formal economic sector in urban areas. However, the gap between cities and countryside might have been shaped quite differently by the two colonial powers. The administrative centralization inspired by the French government system fostered the concentration of business, wealth, and infrastructure in the largest cities. Non-agricultural activities were seldom located in rural areas or small towns. Consistently, as shown in Appendix C, the share of the population of the largest city, i.e. what economic geographers call "primacy," is much higher on average in former French colonies, while the urbanization rate is hardly different from former British colonies. Among our five countries, according to the population censuses, the largest city share of population was 8 percent in 1985 Ghana (Accra), against respectively 17 and 15 percent in 1988 Côte d'Ivoire (Abidjan) and 1983 Guinea (Conakry); the corresponding rates were 5 percent for 1992 Uganda (Kampala) and 9 percent for 1993 Madagascar (Antananarivo). Differences in centralism also influenced post-colonial political economy, as emphasized by anthropologists or political scientists studying the allocation of land and power (Firmin-Sellers, 2000), or the reliance on State institutions (MacLean, 2010) instead of the much criticized direct vs. indirect rule contrast (Boone, 2003). In former French colonies, a tiny bureaucratic bourgeoisie would have favored high wage jobs concentrated in cities that would benefit their sons. In former British colonies, a more decentralized State structure and a more competitive political field would have resulted in less dualistic wages and employment structure.

An alternative explanation would be that spatial dualism is a product of post-colonial structural change rather than a colonial legacy. The rapid creation of a large non-farm sector in Côte d'Ivoire and Guinea, with most of the new jobs concentrated in cities, could have reinforced spatial dualism. The five waves of surveys in Ghana allow looking into this alternative explanation.

Ghana's economic recovery since the end of 1980s translated into a rapid growth in wage employment. We already mentioned that occupational odds-ratios did not significantly change across time for the 1930–69 cohorts. Using the 2005 wave of the Ghana Living Standard Surveys, we can focus on the 1970–79 cohort, who were 25–35 year-olds in 2005 and entered the labor market at a time when more non-farm jobs were created. Compared to the former 1960–69 cohort, we find that the share of farmers falls from 54 to 48 percent, while at the same time the share of private wage jobs increases by 7 percentage points from 17 to 24 percent.

Yet the average earnings gap between farm jobs and non-farm jobs stays around 2, leaving income dualism relatively unchanged. The diversification of activities in rural areas also remains unchanged, at high levels compared to Côte

d'Ivoire or Guinea: among the 56 percent of individuals who live in rural areas, 33 percent of them have non-farm occupations; 29 percent of civil service positions are located in rural areas. Spatial dualism of employment therefore did not greatly increase. Finally, the odds-ratio linking father's and son's occupation reaches 7.3 compared to 5.8 in the previous cohort. This could signal a slight increase in intergenerational reproduction, although the higher share of non-employed individuals (10 percent in the 1970–79 cohort) may bias the estimate upwards. Regardless, it remains much lower than odds-ratios observed for the 1960–69 cohorts, at around the same age, in Côte d'Ivoire, Guinea, or Madagascar.

This piece of evidence suggests that if Ghana, or Uganda, had experienced the same structural change as Côte d'Ivoire or Guinea, more jobs would have been created in rural areas and spatial dualism would have remained lower. It seems therefore that spatial dualism is not mainly a product of structural change, but is rather determined by the pre-existing distribution of activities inherited from colonial times.

7. Conclusion

In this paper we provide a measure of two different kinds of intergenerational occupational mobility—structural and net mobility—for five countries in Sub-Saharan Africa.

We show that the magnitude of intergenerational movements looks similar across four countries except one, but the nature of the movements themselves varies. In Côte d'Ivoire and Guinea, farmers' sons frequently move to the non-farm sector while sons of non-farmers stay in the non-farm sector, whereas in Ghana and Uganda, sons of non-farmers also transition toward the farm sector. Madagascar appears more rigid in both directions. We argue that the magnitude of structural change in employment and in wages accounts for those differences, and explains why Côte d'Ivoire and Guinea had such a high share of intergenerational transitions out of the farm sector.

We then analyze the differences in net mobility across countries, i.e. after structural mobility has been netted out. For the first time we establish a measurement of intergenerational net mobility in those five African countries, which fills a gap in the comparative literature. The ranking of countries is strikingly different from the one obtained for overall mobility flows. Ghana and Uganda stand out as more fluid societies; Côte d'Ivoire and Guinea are less so, while Madagascar displays particularly high reproduction of occupations.

We show that educational mobility can account for a large part of the Madagascar exception, though education does not shed light on other differences between countries. However, the spatial dualism of employment is another powerful explanatory factor: countries differ widely on the geographic distribution of farm and non-farm activities, probably as a historical legacy of different colonial administrations. After controlling for location (place of birth, or, more tentatively, place of residence), differences disappear across the four "mainland" countries. The Madagascar exception remains partly unexplained, and is probably a result of the persisting strength of a caste system, as in India.

Finally, this paper uncovers another channel through which the national identity of the colonial power may have impacted economic structures in Africa. The comparative legacy of different colonial regimes is controversial. In the case of Africa, many scholars underrate differences between colonizers, either because they emphasize pre-colonial to post-colonial continuities (Herbst, 2000), or because they rightly see more similarities than differences within colonial rule (Austin, 2010). The difference in educational performance between former British and former French colonies is often noticed. Surprisingly enough, that difference does not help explain differences in social mobility. We instead encounter the consequence of both elitism and centralization on the spatial concentration of employment. We still acknowledge that the link with colonial legacy is more speculative than firmly established; five countries is a very limited sample, and such comparisons are subject to such issues as the non-random selection of territories by colonizers or the interactions between pre-colonial features and colonial policies.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix A: Surveys
Appendix B: Development Indicators of the Five Countries in 1990
Appendix C: Colonial Legacy