

## Why Do Migrants Migrate? Self-Selection and Returns to Education in West Africa

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Migration from and to African countries is extensive, with estimates ranging from about 16 million international African migrants according to the International Organisation for Migration (IOM 2003) to 50 million according to the African Union (African Union 2005). West Africa in particular has a long history of population mobility, both regionally and internationally. Linked to factors as diverse as long-distance trade, plantation agriculture, and urbanization as well as armed conflict, land degradation, and drought, migration in the region played and still plays a major part in shaping settlement patterns. At the political level, several initiatives, including the free movement of people institutionalized by the Economic Community of West African States (ECOWAS), have facilitated labor migration. With this background in mind, this chapter examines the locational choice of a large sample of Africans originating in seven cities in the West African Economic and Monetary Union (WAEMU).<sup>1</sup>

Concern with migration emerged with the work of Sjaastad (1962). In the development literature, however, Todaro (1969) and Harris and Todaro (1970) were the first to present a model in which the decision to migrate results from the rational comparison of the expected costs and benefits of migration. In both models, the difference in average expected earnings between countries or regions of destination and countries or regions of origin plays a key role and is predicted to have a positive effect on migration flows. This kind of model is unable to explain key stylized facts, however, such as migration flows from and to particular regions or countries.

Borjas (1987) and Dahl (2002) adopt a different approach, based on the seminal paper of Roy (1951). In Roy's framework, workers select into income-earning

activities on the basis of their comparative advantage. Applied to residential choice, this model explains migration not by average expected earnings differentials but rather by differences in individual expected returns to skills that are either observed or unobserved by the econometrician. As a result, migration flows are not necessarily one-sided. This literature argues that migrants' self-selection should be taken into account when estimating the returns to human capital in countries where the flow of migrants is significant.

Estimation of this kind of model is usually very difficult, however, because of the impossibility of gathering data on origin and destination labor markets at the same time. In this chapter, we take advantage of the fact that the 1-2-3 surveys of the Programme d'Appui Régional à la Statistique (PARSTAT) project were conducted simultaneously, with the same questionnaire, thus providing the data needed to study migration choices in the region (for a description of these surveys, see box O.1 in the overview). Data on the country of birth and the last country of residence allow international migrants to be identified within each national sample.

This chapter is important for three reasons. First, it fills a gap in the knowledge of cross-border migration within Africa. Second, it evaluates the extent of the bias in the estimated returns to education when international migration is not accounted for. Third, it determines whether earnings differentials matter in the choice of the country of residence.

The model assumes that individuals are born randomly in one of the seven countries under review (Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, and Togo) but rationally choose the country in which they reside by comparing the utility associated with each choice. Estimation of this model provides unbiased estimates of the returns to education, together with the effect of expected earnings differentials on the probability of choosing a particular country. Given the data at hand, the universe of destination countries is restricted to countries that are close to one another geographically, legally, culturally, and economically. The seven countries studied share the same language (French), use a common currency (the CFA franc), and, most important, belong to ECOWAS, within which people are free to move and settle.

We cannot account for migration movements outside the WAEMU region. Although this restriction is regrettable and constitutes a clear limitation of our study, it nevertheless makes sense to analyze migrants' choice of destination in West Africa, where there are no legal barriers to migrate and most international migration takes place intraregionally. We find that migration behavior plays an important role in determining earnings differentials between countries and between individuals with different education levels. Our results also suggest that earnings differentials matter in locational choice.

This chapter is organized as follows. The first section presents the data and some descriptive statistics. The second section specifies the model and describes

the estimation strategy. The third section discusses the model identification and the choice of variables. The fourth section provides the estimation results. The last section summarizes the chapter's main conclusions.

## Data and Descriptive Statistics

Movements of labor are not a new phenomenon in West Africa. For generations, people have migrated in response to demographic, economic, political, and other factors, such as population pressure, environmental disasters, poverty, and conflicts.

Despite their importance, little is known about these migrations. The information provided by census data; immigration and emigration statistics; and a small number of ad hoc surveys on the number, identity, and motivations of both inter- and intracontinental African migrants is spotty and unreliable. Evidence is even scarcer concerning transborder migrations within the West African subregion. How many transborder migrants are there in each West African country? Who are these migrants? What are their main motivations? These are some of the questions this chapter addresses.

The data used are a pooling sample of the seven 1-2-3 surveys of the PAR-STAT project. All seven French-speaking members of WAEMU belong to ECOWAS. At the time of its creation, in 1975, one of the key objectives of ECOWAS was to remove obstacles to the free movement of goods, capital, and people in the subregion. In line with this objective, the Protocol on Free Movement of Persons and the Right of Residence and Establishment was signed in May 1979; the right of entry was established in 1980 and the right of residence in 1986. In 2000, members of ECOWAS agreed to introduce a new passport for citizens of the subregion, which will gradually replace national passports. Although much remains to be done to achieve complete liberalization of labor migration within the community, these measures to create a borderless West Africa provide a good opportunity to study the residential choice of people within the community.

We consider as migrants all individuals who meet the following three criteria: they are not citizens of the country they reside in; they were not born in the capital city of the country they reside in; and they have not been residing continuously in the capital city since they were born.<sup>2</sup> Individuals who are not migrants are considered natives. In the empirical analysis that follows, we restrict the sample to all active individuals 15–65 originating in one of the seven countries covered by the 1-2-3 surveys and residing in the capital city of one of these countries, either as natives or immigrants.

As the figures in table 10.1 suggest, a wide variety of migration configurations is evident within WAEMU. Despite the severe sociopolitical crisis that started

**Table 10.1** Composition of Samples Used to Analyze Migration in West Africa, 2001/02

City	Number of immigrants from									Total number of immigrants	Total number of natives	Total sample size
	Benin	Burkina Faso	Côte d'Ivoire	Mali	Niger	Senegal	Togo	Other	No data			
Abidjan	53	446		256	90	72	87	310	133	1447	<b>5,974</b>	7,416
Of which WAEMU nationals	<b>52</b>	<b>428</b>		<b>231</b>	<b>85</b>	<b>65</b>	<b>79</b>	120	124	1184		
Bamako	8	14	11		8	12	0	62	8	123	<b>7,148</b>	7,272
Of which WAEMU nationals	<b>3</b>	<b>13</b>	<b>10</b>		<b>6</b>	<b>11</b>	<b>0</b>	36	6	85		
Cotonou		3	6	15	58	3	102	138	18	343	<b>6,994</b>	7,337
Of which WAEMU nationals		<b>3</b>	<b>6</b>	<b>15</b>	<b>55</b>	<b>2</b>	<b>100</b>	38	16	235		
Dakar	11	0	2	9	0		4	130	53	209	<b>11,773</b>	11,977
Of which WAEMU nationals	<b>7</b>	<b>0</b>	<b>2</b>	<b>9</b>	<b>0</b>		<b>1</b>	74	35	128		
Lomé	88	9	9	11	50	3		113	23	306	<b>5,927</b>	6,254
Of which WAEMU nationals	<b>87</b>	<b>9</b>	<b>8</b>	<b>11</b>	<b>44</b>	<b>3</b>		24	21	207		
Niamey	76	49	4	122		5	59	52	26	393	<b>7,710</b>	8,106
Of which WAEMU nationals	<b>67</b>	<b>49</b>	<b>4</b>	<b>119</b>		<b>5</b>	<b>48</b>	27	23	342		
Ouagadougou	11		7	8	2	1	16	18	11	74	<b>8,198</b>	8,251
Of which WAEMU nationals	<b>6</b>		<b>7</b>	<b>7</b>	<b>0</b>	<b>1</b>	<b>16</b>	5	7	49		
Total	247	521	39	421	208	96	268	823	272			
Of which WAEMU nationals	<b>222</b>	<b>502</b>	<b>37</b>	<b>392</b>	<b>190</b>	<b>87</b>	<b>244</b>	324	232			

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries in the West African Economic and Monetary Union (WAEMU) conducted in 2001/02 by the Observatoire économique et statistique d'Afrique Subsaharienne (AFRISTAT); Développement, Institutions et Mondialisation (DIAL); and national statistics institutes.

Note: All individuals 15–65 are considered as natives of country *i* if they always resided in country *i*, whether or not they identify themselves as citizens. Within the sample of immigrants coming from one of the six other WAEMU countries, some are not WAEMU nationals (for example, a French national who spent 10 years in Burkina Faso before moving to Benin is recorded as a migrant coming from Burkina Faso but is not Burkinabe). Groups considered in the analysis are in bold. WAEMU = West African Economic and Monetary Union.

with the military coup of 1999 and resulted in reverse flows of migrants, Côte d'Ivoire is still by far the most important immigration country in the WAEMU region.<sup>3</sup> Although migration flows from Burkina Faso and Mali have been fluctuating since the beginning of the crisis, these two neighboring countries remain the main source of migrants to Côte d'Ivoire. About 15 percent of Abidjan's population between 15 and 65 are immigrants, among which 74 percent are citizens of a WAEMU country (table 10.2).

By contrast, immigrants from bordering WAEMU countries account for only a marginal share of the population in Dakar, the capital of Senegal. Less than 2 percent of Dakar's inhabitants are non-Senegalese, among which a large share comes from Guinea, Guinea-Bissau, The Gambia, Mauritania, or Mali. Expatriates from Mali and Burkina Faso and living in the capital city of a WAEMU country largely outnumber the expatriates from WAEMU countries residing in Bamako or Ouagadougou, suggesting that the two countries remain major labor-exporting countries. By contrast, Benin, Niger, and Togo combine both emigration and immigration.

Table 10.3 reports census statistics on immigrants by country of origin in each of the seven countries studied. Overall, the same general migration patterns emerge: national data confirm the position of Côte d'Ivoire as the main labor-importing country of the region, with most migrants coming from Mali or Burkina Faso. They also confirm the marginal participation of Senegal in intraregional migration flows and the role of Benin, Niger, and Togo as both importers and exporters of labor. The picture for Burkina Faso, however, strongly differs from the one drawn based on data from Ouagadougou only. Rural Burkina Faso is indeed found to host a fairly large number of Malian migrants, who are not accounted for in our urban sample. Our inferences for Burkina Faso using data on Ouagadougou should thus be considered with caution.

**Table 10.2** Weighted Shares of Immigrants among Urban Residents in Seven Cities in West Africa, 2001/02  
(percent)

Migrant status	Abidjan	Bamako	Cotonou	Dakar	Lomé	Niamey	Ouagadougou
Natives	84.1	98.4	96.4	98.5	95.5	95.6	99.3
Immigrants	15.9	1.6	3.6	1.6	4.5	4.4	0.7
<i>Of which:</i>							
From WAEMU country	73.5	43.8	60.6	13.0	60.7	85.7	70.7
From other developing country	25.2	43.4	36.4	83.9	38.8	12.2	23.9
From developed country	1.3	12.6	3.1	3.1	0.8	2.2	6.2

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

Note: WAEMU = West African Economic and Monetary Union.

**Table 10.3** Composition of Migrant Population in Seven Countries in West Africa, 2000

Country	Percentage of immigrants coming from							Total number of immigrants
	Benin	Burkina Faso	Côte d'Ivoire	Mali	Niger	Senegal	Togo	
Benin		4.7	20.0	5.1	25.3	0.4	44.5	57,971
Burkina Faso	10.2		4.9	61.1	19.3	1.9	2.7	717,271
Côte d'Ivoire	3.7	58.8		29.3	7.8	0.2	0.1	1,661,157
Mali	18.8	49.4	3.2		17.8	4.5	6.3	22,529
Niger	15.9	17.1	7.8	55.3		1.3	2.5	60,922
Senegal	4.8	12.2	1.0	76.1	4.4		1.5	31,077
Togo	77.8	0.8	0.1	2.9	18.1	0.3		92,234
Total number of emigrants	221,362	1,006,194	52,335	987,480	305,471	20,198	50,121	2,643,161

Source: National census data circa 2000.

### Representativeness of Sample

It is likely that the migrants' samples from the 1-2-3 surveys are not representative of the whole population of migrants, because they exclude individuals who moved out of their country to settle in a rural area of another WAEMU country. These migrants may strongly differ from the migrants recorded in our samples, especially with regard to their distribution by country of origin.

Another issue possibly affecting the representativeness of our samples relates to the fact that immigrants are a relatively small share of the population and may cluster in some areas. Given the sampling frame of the 1-2-3 surveys, it is possible that such areas were missed when the census sectors were selected in the first stage. This possibility cannot be ruled out in some cities.

We believe our samples are representative in Abidjan, Bamako, and Lomé. In Lomé, where 125 of 129 census sectors were selected, the probability that we missed clusters of migrants is low. In Abidjan and Bamako, our estimates on the immigration rate at the level of the city and on the composition of migrants' stocks by country of origin are very similar to the estimates obtained using census data. In addition, we used our representative samples of census sectors in each city to test the null hypothesis of random allocation of migrants across neighborhoods and rejected it in none of our samples. For other countries, the representativeness of the sample can be questioned.

### Migrants' Main Characteristics

Table 10.4 provides descriptive statistics on the main characteristics of natives and immigrants by city of residence. Several findings are worthy of note. First, women are underrepresented in the immigrant populations of Abidjan, Ouagadougou, and Lomé but slightly overrepresented among the

**Table 10.4 Mean Characteristics of Natives and Immigrants in Seven Cities in West Africa, 2001/02**  
(percent, except where otherwise indicated)

Variable	Abidjan		Bamako		Cotonou		Dakar		Lomé		Niamey		Ouagadougou	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
Men	47.6	61.5**	49.1	51.1	48.2	42.5	47.1	47.4	47.6	56.2**	48.6	43.5	50.7	54.1
Age (years)	29.0	34.6**	31.2	30.4	31.1	30.8	30.9	33.9	30.4	30.9	30.7	33.9**	30.2	30.4
<i>Education and experience</i>														
Years of experience	16.4	26.6**	20.3	18.1	18.5	21.3	19.5	19.4	17.7	20.4**	19.6	25.5**	19.1	18.7
Years of schooling	6.6	2.0**	4.8	5.8	6.6	3.6**	5.3	8.6**	6.6	4.5**	5.1	2.3**	5.1	5.7
No diploma	44.7	83.5**	58.4	55.8	45.8	72.4**	60.2	31.6**	42.8	63.0**	60.9	81.5**	54.3	54.1
Completed primary education	27.6	10.2**	19.2	16.3	26.7	14.9**	18.5	15.8	31.9	24.7**	20.3	11.6**	24.6	13.5
BEPC ( <i>Brevet d'études du premier cycle du second degré</i> )	10.4	2.7**	8.1	4.7	13.2	6.1**	11.0	21.1	14.7	5.6**	7.2	2.4**	11.3	18.9
Baccalauréat	4.8	0.6**	2.2	7.0**	4.0	3.9	3.8	5.3	3.2	1.2	2.6	0**	1.6	0
Can read and write in French	73.8	28.5**	49.2	51.2	71.6	37.0**	60.4	73.7	73.7	53.7**	56.5	29.8**	59.6	64.9
Can read and write in other language	25.0	10.9**	12.2	34.9**	24.5	26.5	19.3	47.4**	27.1	22.2	21.6	18.2	13.3	24.3**
<i>Religion</i>														
Muslim	31.2	73.3**	97.2	79.1**	9.9	47.0**	93.3	57.9**	9.6	45.7**	98.2	76.4**	55.8	37.8**
Catholic	35.9	17.8**	1.8	18.6**	67.2	31.5**	6.6	42.1**	47.6	24.7**	1.2	19.5**	36.2	18.9**
Protestant	10.7	3.4**	0.5	2.3	5.2	3.9	0.1	0	10.2	0.6	0.4	3.4**	6.5	27.0**
Number of observations	5,974	940	7,148	43	6,994	181	11,773	19	5,927	162	7,710	292	8,198	37

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

\* significant at the 10 percent level, \*\* significant at the 5 percent level, \*\*\* significant at the 1 percent level

immigrant populations of Cotonou and Niamey. Traditional male-dominated short- to long-distance migratory streams in West Africa are thus becoming feminized, suggesting a turnaround in traditional gender roles. Second, immigrants are significantly older than natives in Abidjan, and Niamey but roughly of the same age as natives in the other cities. Third, immigrants appear to be less educated on average than natives in four cities (Abidjan, Cotonou, Lomé, and Niamey). The education gap is particularly large in Abidjan, where immigrants have 2.0 years of schooling on average against 6.6 years for natives.

The statistics for natives were computed using data collected in capital cities only. Some of them are thus likely to be bad proxies for the situation at the national level (mean education levels, for example, are generally much higher in urban areas than in rural ones). It should consequently come as no surprise that immigrants in Abidjan, Cotonou, Lomé, and Niamey (a majority of whom may come from rural areas) are on average less educated than nationals in these cities. The fact that in Bamako, Dakar, and Ouagadougou, immigrants appear to be more educated on average than natives suggests that these cities attract mainly educated people or people from urban areas. Because of the small sample size, however, the figure for Dakar should be taken with caution.

As a complement to table 10.4, table 10.5 provides some descriptive statistics on the main characteristics of natives (“stayers”) and emigrants (“movers”), by country of origin. In all countries except Togo and, to a lesser extent, Benin, men are overrepresented in the emigrant population. Intra-regional migratory flows from these two countries are motivated mostly by commercial purposes and have traditionally been dominated by women. In terms of education, emigrants appear much less educated than nonmigrant natives in all countries, suggesting that migration flows within the WAEMU region mainly involve low-qualified workers.

### **Migrants’ Employment Status**

On average, labor force participation is higher for immigrants than for natives.<sup>4</sup> The difference is particularly large in Abidjan and Niamey, suggesting that migration streams to these cities are motivated mainly by labor market considerations. Given the individual characteristics of immigrants, particularly with respect to their level of education, one would expect their employment situation to be less favorable than that of natives in Abidjan, Cotonou, Lomé, and Niamey and more favorable in Dakar. In developing economies, formal wage workers in the public or private sector are considered to have a favorable employment situation; informal sector workers are considered to have an unfavorable situation.

The figures in table 10.6 indicate that this is indeed the case. The percentage of immigrants working in the informal sector is much higher than the percentage of natives in Abidjan, Bamako, Cotonou, Lomé, and Niamey; it is lower in Dakar and Ouagadougou.



**Table 10.5 Mean Characteristics of Natives and Emigrants in Seven Cities in West Africa, 2001/02**  
(percent, except where otherwise indicated)

Variable	Abidjan		Bamako		Cotonou		Dakar		Lomé		Niamey		Ouagadougou	
	Natives	Emigrants	Natives	Emigrants	Natives	Emigrants	Natives	Emigrants	Natives	Emigrants	Natives	Emigrants	Natives	Emigrants
Men	47.6	54.1	49.1	57.4**	48.2	44.6	47.1	71.2**	47.6	38.5**	48.6	67.9**	50.7	58.4**
Age (years)	29.0	27.9	31.2	34.9**	31.1	32.8**	30.9	37.4**	30.4	30.2	30.7	31.7	30.2	34.7**
<i>Education and experience</i>														
Years of experience	16.4	15.4	20.3	27.7**	18.5	21.5**	19.5	26.9**	17.7	20.0**	19.6	23.4**	19.1	27.0**
Years of schooling	6.6	6.5	4.8	1.2**	6.6	5.3**	5.3	4.1**	6.6	4.2**	5.1	2.3**	5.1	1.8**
No diploma	44.7	43.2	58.4	90.3**	45.8	55.9**	60.2	65.5	42.8	67.2	60.9	81.6**	53.3	86.5**
Completed primary education	27.6	21.6	19.2	6.4**	26.7	23.4	18.5	14.9	31.9	19.3**	20.3	11.6**	24.6	9.0**
BEPC ( <i>Brevet d'études du premier cycle du second degré</i> )	10.4	8.1	8.1	1.0**	13.2	8.6**	11.0	6.9	14.7	7.0**	7.2	2.6**	11.2	2.2**
<i>Baccalauréat</i>	4.8	8.1	2.2	0.3**	4.0	0.9**	3.8	6.9	3.2	0.8**	2.6	1.1	1.6	0.4**
Can read and write in French	73.8	64.9	49.2	16.1**	71.6	57.2**	60.4	51.7	73.7	48.0**	56.5	27.9**	59.6	27.9**
Can read and write in another language	25.0	37.8**	12.2	13.3	24.5	18.9	19.3	21.8	27.1	18.0**	21.6	31.9**	13.3	8.2**
<i>Religion</i>														
Muslim	31.2	51.4**	97.2	99.2**	9.9	25.2**	93.3	86.2	9.6	24.2**	98.2	96.3	55.8	69.5**
Catholic	35.9	16.2**	1.8	0.3**	67.2	38.7**	6.6	10.3	47.6	44.3	1.2	1.6	36.2	26.1**
Protestant	10.7	2.7	0.5	0.5	5.2	6.8	0.1	1.1**	10.2	12.3	0.4	0.5	6.5	2.2**
Number of observations	5,974	37	7,148	392	6,994	222	11,773	87	5,927	244	7,710	190	8,198	502

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

\* significant at the 10 percent level, \*\* significant at the 5 percent level, \*\*\* significant at the 1 percent level.

**Table 10.6 Employment Situation of Natives and Immigrants in Seven Cities in West Africa, 2001/02**  
(percent except where otherwise indicated)

Variable	Abidjan		Bamako		Cotonou		Dakar		Lomé		Niamey		Ouagadougou	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
<i>Employment status</i>														
Employed	59.7	77.9	57.5	58.1	68.0	73.1	50.4	57.9	70.6	74.7	47.5	65.7	56.6	56.8
Unemployed	11.4	4.7	4.2	2.3	4.1	2.2	7.5	0.0	6.7	3.7	7.9	3.8	11.0	16.2
Inactive	28.8	17.5	38.4	39.5	27.9	26.5	42.1	42.1	22.6	21.6	44.6	30.5	32.3	27.0
Number of observations	5,974	940	7,148	43	6,994	181	11,773	19	5,927	162	7,710	292	8,198	37
<i>Sector</i>														
Public sector	8.4	1.0	11.5	4.0	8.8	0.0	9.0	0.0	8.1	1.7	17.9	1.0	13.9	9.5
Formal private sector	21.4	12.7	11.7	8.0	11.6	10.9	17.6	36.4	8.2	12.4	13.6	10.4	9.0	19.1
Informal private sector	70.2	86.3	76.8	88.0	79.5	89.1	73.4	63.6	83.8	86.0	68.5	88.6	77.1	71.4
<i>Wage</i>														
Hourly wage (CFA francs, purchasing power parity)	467	276	347	578	255	182	417	754	192	255	337	234	271	240
Number of observations	3,569	732	4,107	25	4,759	129	5,935	11	4,186	121	3,664	192	4,642	21

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

Average hourly earnings follow roughly the same pattern. Compared with natives, immigrants earn much lower hourly wages in Abidjan (-41 percent), Niamey (-30 percent), and Cotonou (-29 percent); they earn much higher hourly wages in Dakar (91 percent), Bamako (67 percent), and Lomé (33 percent).<sup>5</sup> Lomé is an anomaly: although immigrants are less educated on average and more concentrated in the informal sector, they earn significantly higher hourly wages than natives.

## Model Specification and Estimation Strategy

We take advantage of the simultaneity and strict comparability of the 1-2-3 surveys to evaluate the impact of hourly wage differences in the seven cities on individuals' residential choice. The econometric estimation is performed in three steps. First, using the pooled sample of 31,647 individuals observed in the seven cities, we estimate the determinants of individual residential choice, assuming that it reflects comparison of the hourly wage that can be obtained in each destination city, together with other variables. More precisely, we assume that each individual  $i$  born in country  $j$  and living in city  $k$  derives utility from its choice of residence, written as

$$u_i(j, k) = \alpha \cdot \ln y_{ik} + \mathbf{z}'_i \cdot \boldsymbol{\gamma}_k + v_i(j, k) \quad (10.1)$$

with  $\ln y_{ik}$  the logarithm of individual  $i$  hourly earnings in city  $k$ , and  $\mathbf{z}_i$  a vector of individual characteristics, such as religion. Individual  $i$  prefers to live in city  $k$  if doing so yields the highest utility:

$$u_i(j, k) - c(j, k) \geq u_i(j, l) - c(j, l) \quad \text{for all } l \quad (10.2)$$

where  $c(j, k)$  is the cost of settling in city  $k$  when born in country  $j$ .<sup>6</sup> These costs cannot be observed. In the econometric estimation of the model, we use nationality dummies to account for them, assuming that individuals originating from the same country face the same level of costs.

As individual hourly wages are observed only in the city of residence, equation (10.1) is estimated in a reduced form, obtained by replacing the logarithm of wage by a linear combination of its determinants:

$$u_i(j, k) = \alpha \cdot (\mathbf{x}'_{ik} \cdot \boldsymbol{\beta}_k) + \mathbf{z}'_i \cdot \boldsymbol{\gamma}_k + \varepsilon_i(j, k) \quad (10.3)$$

Under appropriate assumptions on the distribution of the error term, this model can be estimated as a multinomial logit. The estimated coefficients can then be used to predict individual probabilities of residing in a given city.

Second, we use the predicted probabilities computed in the first step to correct for the self-selection of migrants in the hourly wage equation:

$$\ln y_{ik} = \mathbf{x}'_{ik} \boldsymbol{\beta}_k + u_{ik}. \quad (10.4)$$

Holding account of migrants' self-selection is necessary because migrants could share some unobservable characteristics (such as motivation) that could be correlated with other observable determinants of wages (such as education). Following Dahl (2002), we correct for self-selection by adding to the wage equation a polynomial function of the choice probabilities computed in the first step as a control for unobserved characteristics that would otherwise bias the estimates.

Third, we use hourly wages estimated for each individual in each country to evaluate the impact of expected wage differences on the probabilities of choice (that is, the value of coefficient  $\alpha$  in equation [10.1]).

## Model Identification and Choice of Variables

In order to be identified, our model relies on various assumptions, which need to be properly tested. In particular, in the second step of our procedure, in which we correct for individuals' self-selection, it is important to include one or more variables that explain locational choice (that is, enter the first-stage equation) but do not influence earnings. In what follows, we use dummies indicating whether the individual's father did not go to school or was absent when the individual was 15, together with dummies for the individual's religion and nationality, as identifying variables. Religion is likely to have an influence on destination choice, given that the dominant religion is different in different cities. Nationality dummies are included to account for macro-level variables, such as average gross domestic product per capita, mortality rates, and the shares of immigrants from ECOWAS countries in the city's population. These variables also capture migration costs between the origin country and destination city.

Any one of these exclusion restrictions could be violated. For example, if there is discrimination against people of a particular nationality or religion in a particular destination city, these variables would influence earnings. If the quality of education is different for people from different countries, nationality could also influence earnings by affecting schooling differences. We believe discrimination on the basis of nationality or religion to be second-order concerns within the cities of our sample, and there is evidence that the quality of schooling does not differ dramatically across countries of origin.<sup>7</sup>

It could also be argued that father's education and father's presence in the household when individuals are 15 are correlated with household wealth, which

affects occupational choice and earnings. However, overidentification tests do not reject the null hypothesis of zero correlation between our instruments and the principal equation error terms in five of seven cities.

In the third stage of our procedure, identification of the log-earnings coefficient in the structural model of residential choice depends on the exclusion from equation (10.1) of at least one variable that enters in the log-earnings equation (10.3). We assume that gender, education, and employment sector explain log-hourly earnings but not residential choice, once earnings are accounted for. There are some good reasons why education might determine residential choice, apart from its impact on potential earnings. One possibility is that well-educated individuals prefer cities in which the average level of education is high, not only because their own wages are more likely to be higher but also because they will benefit from positive externalities related to the high average level of education (such as a richer supply of cultural goods). In our sample, however, movers appear much less educated on average than stayers, in both origin countries' capitals and destination cities. We therefore believe this incentive to be low.

It could also be argued that people moving abroad experience a loss in utility because of the remoteness of their home country, extended family, and friends. This loss could induce a direct effect of the gender variable on locational choice, in addition to its indirect effect through earnings, if men (women) experience a greater loss than women (men). However, it is not clear whether the difference between men and women in this utility loss should be large, as both rely on networks of family and friends and may have similar preferences to remain in their home country.

Excluding the employment sector from the locational choice decision does not seem too heroic an assumption given the strong similarities in the structure of urban labor markets (and in the share of public versus private and formal versus informal jobs in particular) in the seven cities.

In the earnings equation, the dependent variable is the logarithm of total hourly earnings in CFA francs. All earnings are expressed in purchasing power parity (PPP). The conversion to PPP CFA francs is necessary in the third step of our estimation, where expected earnings in the seven cities are allowed to influence the probability of choice.<sup>8</sup> Independent variables in the earnings equations are gender, education (as measured by the last diploma obtained), potential labor market experience and its square, the ability to speak French, the ability to speak another foreign language, dummies for the public or private formal sectors, and a series of dummies for the father's activity when the individual was 15. This last set of variables is included both as a determinant of migration behavior and as a proxy for the individual's sector choice, to account for earnings differentials between sectors. The reduced-form multinomial logit model includes these variables, together with dummies for the individual's religion and nationality.

As our estimation strategy is a multistep procedure, we bootstrapped the entire process with 50 replications. Bootstrapped standard errors were used for hypothesis testing.

## Estimation Results

We first present the results of the multinomial logit model before turning to the earnings equations and the structural model of residential choice. The section ends with some robustness checks.

### Reduced-Form Multinomial Logit of Residential Choice

Tables 10.7–10.9 present the estimation results. Table 10.7 shows the results of the reduced-form multinomial logit estimation. These results are difficult to comment on, because only the differences in the coefficients with respect to the reference city (Dakar) can be identified. Thus, for instance, the positive coefficient of the gender variable in the equation for Cotonou indicates that being

**Table 10.7** Reduced-Form Multinomial Logit Estimates of Individual Residential Choice in Seven Cities in West Africa, 2001/02

Variable	Abidjan	Bamako	Cotonou	Lomé	Niamey	Ouagadougou
Gender (1 = male)	1.35*** (0.29)	0.20 (0.32)	0.97*** (0.33)	1.14*** (0.33)	0.34 (0.32)	0.76** (0.31)
CEP ( <i>Certificat d'études primaires</i> )	-0.20 (0.45)	-0.04 (0.51)	-0.67 (0.50)	-0.12 (0.49)	-0.35 (0.50)	0.43 (0.49)
BEPC ( <i>Brevet d'études du premier cycle du second degré</i> )	-0.25 (0.58)	0.01 (0.71)	-1.06 (0.65)	-0.49 (0.65)	-0.79 (0.67)	0.87 (0.67)
CAP ( <i>Certificat d'aptitude professionnelle</i> )	0.60 (1.07)	1.77 (1.19)	-1.03 (1.17)	-1.04 (1.16)	0.08 (1.19)	1.73 (1.19)
BEP ( <i>Brevet d'études professionnelles</i> )	-1.05 (1.95)	0.52 (1.91)	-3.20 (2.06)	-0.24 (2.00)	-0.81 (1.99)	1.09 (2.09)
Baccalauréat	1.10* (0.60)	1.35 (0.88)	1.24 (0.80)	1.60** (0.77)	1.37* (0.79)	2.32*** (0.89)
Foundation degree <sup>a</sup>	-0.43 (1.77)	0.21 (1.84)	-2.62 (1.82)	-1.49 (1.84)	-0.86 (1.85)	1.07 (1.91)
Bachelor's degree	-0.43 (0.92)	0.51 (1.00)	-1.53 (1.00)	-1.20 (1.00)	-0.07 (0.99)	0.84 (1.03)
Postgraduate degree	-4.88*** (1.06)	-3.85*** (1.07)	-5.51*** (1.02)	-5.45*** (1.07)	-3.99*** (1.06)	-4.01*** (1.17)

(continued next page)

**Table 10.7 (continued)**

Variable	Abidjan	Bamako	Cotonou	Lomé	Niamey	Ouagadougou
Marital status (1 = married)	-0.83*** (0.30)	-0.08 (0.33)	-0.34 (0.35)	-0.45 (0.34)	-0.42 (0.34)	-0.65** (0.33)
Speaks French (1 = yes)	-0.29 (0.34)	-0.05 (0.39)	-0.16 (0.40)	0.22 (0.39)	0.22 (0.39)	-0.08 (0.37)
Speaks another language (1 = yes)	0.20 (0.35)	-0.08 (0.39)	1.19*** (0.41)	1.06*** (0.41)	0.23 (0.40)	0.07 (0.41)
Experience (years)	0.16*** (0.04)	-0.04 (0.05)	0.04 (0.04)	0.04 (0.05)	0.08* (0.05)	0.03 (0.05)
Experience squared	-0.002*** (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Public sector	-1.60*** (0.59)	0.26 (0.63)	-0.18 (0.63)	-0.29 (0.62)	-0.16 (0.62)	0.52 (0.66)
Private sector	-0.17 (0.35)	0.28 (0.39)	0.14 (0.42)	-0.24 (0.41)	0.19 (0.40)	-0.84** (0.38)
Father in agricultural sector	0.72** (0.35)	-0.41 (0.38)	0.12 (0.39)	0.20 (0.39)	-0.02 (0.38)	-0.07 (0.38)
Father in industrial sector	-0.05 (0.52)	-0.52 (0.60)	-0.85 (0.60)	-0.68 (0.60)	-0.40 (0.60)	-0.80 (0.62)
Father in commercial sector	1.38*** (0.35)	0.97** (0.42)	0.81 (0.43)	1.15** (0.43)	0.63 (0.41)	1.20*** (0.41)
Father was senior executive	1.20** (0.59)	1.27* (0.73)	0.34 (0.72)	0.67 (0.72)	1.07 (0.73)	1.99** (0.79)
Father was midlevel executive	0.02 (0.58)	0.61 (0.65)	0.48 (0.64)	-0.08 (0.63)	0.61 (0.64)	0.22 (0.66)
Father was absent at age 15	1.01** (0.48)	0.69 (0.53)	1.47*** (0.54)	1.14** (0.54)	0.63 (0.53)	0.35 (0.53)
Father never went to school	-0.59* (0.34)	-0.69* (0.38)	-0.56 (0.37)	-0.91** (0.37)	0.10 (0.38)	0.31 (0.37)
Father schooling missing	-4.62*** (0.65)	-2.79*** (0.65)	-7.09*** (0.77)	-3.75*** (0.70)	-3.05*** (0.68)	-3.72*** (0.69)
Muslim	-5.74*** (1.78)	-5.72*** (1.84)	-6.00*** (1.80)	-6.88*** (1.79)	-3.18* (1.84)	-5.55*** (1.82)
Catholic	-4.97*** (1.80)	-4.97** (1.88)	-4.15** (1.82)	-5.37*** (1.81)	-3.20* (1.86)	-4.57** (1.84)
Protestant	-1.93 (2.15)	-2.65 (2.25)	-2.47 (2.17)	-3.39 (2.16)	-0.83 (2.22)	-0.92 (2.19)
Intercept	-1.62 (1.94)	-0.92 (2.03)	-3.98*** (2.21)	-2.35*** (2.03)	-6.01*** (2.10)	-4.83** (2.23)
Number of observations	31,647	31,647	31,647	31,647	31,647	31,647

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

Note: The dependent variable takes the value 1 (Cotonou) to 7 (Lomé), with 6 (Dakar) used as the comparison category. Nationality dummies were included but are not shown. Figures in parentheses are standard errors. University system derives from the French system, in which, until recently, second-year students could receive a diploma. This diploma is referred to here as the foundation degree.

\* significant at the 10 percent level, \*\* significant at the 5 percent level, \*\*\* significant at the 1 percent level.

male has a larger effect on the utility resulting from choosing Cotonou than the utility resulting from choosing Dakar. The results suggest that, among the seven cities under review, holding a postgraduate degree or being Muslim or Catholic increases the utility of living in Dakar more than the utility of living in any other city. By contrast, holding a *baccalauréat* degree increases the utility of residing in Abidjan, Niamey, Ouagadougou, or Lomé by much more than that of residing in Dakar. Unsurprisingly, being of Senegalese nationality increases the utility of living in Dakar much more than that of living in any other city except Bamako, where the coefficient is insignificant (results not shown).

### Earnings Equation

Following Dahl (2002), we use the estimated coefficients of the reduced-form multinomial logit to compute, for each observation of the sample, a polynomial of choice probabilities that was added to the set of explanatory variables in the earnings equations. Table 10.8 presents the ordinary least squares regression results. As the coefficients of the polynomials of the selection probabilities have no interpretation, we limit the presentation to the coefficients of the variables that have a direct interpretation.

The first column shows the estimated coefficients when no correction for endogenous selection is made. The second column presents the corrected coefficients. The results of a series of Wald tests are shown at the bottom of the table.

We computed several test statistics. First, we tested whether the selection correction terms enter the earnings equation significantly. Second, we tested the hypothesis that the excluded variables (father, religion, and nationality dummies) make no significant contribution to the explanation of the dependent variable.

Tests confirm that the model is correctly identified. With the exception of Bamako and Lomé and the father dummies, the Wald test statistics are insignificant, indicating that the vector of variables used to instrument residential choice does not contribute to the determination of earnings once the correction terms are included. For Bamako and Lomé, including the father dummies as explanatory variables did not change the results significantly.

As for the correction functions, in four cities (Abidjan, Bamako, Cotonou, and Lomé), we can reject the hypothesis that the coefficients of the polynomials included to correct for endogenous selection are all zero, suggesting that holding account of migrants' self-selection affects the estimation of earnings equations in these cities. In no case, however, does adjusting for self-selection change the returns to education enough that the adjusted coefficients lie outside the confidence intervals for the unadjusted estimates. This result suggests either that, given the relatively small number of migrants in our samples, selection



**Table 10.8 Ordinary Least Squares Log-Earnings Regressions for Seven Cities in West Africa, 2001/02**

Variable	Abidjan		Bamako		Cotonou		Dakar		Lomé		Niamey		Ouagadougou	
Gender (1 = male)	0.40*** (0.05)	0.44*** (0.05)	0.33*** (0.04)	0.30*** (0.06)	0.46*** (0.04)	0.45*** (0.04)	-0.15*** (0.05)	-0.18*** (0.05)	0.31*** (0.05)	0.28*** (0.07)	0.23*** (0.05)	0.28*** (0.07)	0.41*** (0.05)	0.31*** (0.08)
CEP ( <i>Certificat d'études primaires</i> )	0.55*** (0.07)	0.55*** (0.08)	0.21*** (0.07)	0.23** (0.10)	0.54*** (0.06)	0.50*** (0.08)	0.36*** (0.07)	0.36*** (0.08)	0.52*** (0.07)	0.52*** (0.08)	0.52*** (0.09)	0.53*** (0.13)	0.44*** (0.08)	0.45*** (0.08)
BEPC ( <i>Brevet d'études du premier cycle du second degré</i> )	1.17*** (0.10)	1.19*** (0.08)	0.53*** (0.11)	0.56*** (0.13)	1.00*** (0.09)	0.94*** (0.09)	0.58*** (0.09)	0.57*** (0.09)	1.11*** (0.10)	1.13*** (0.10)	1.07*** (0.14)	1.08*** (0.13)	1.31*** (0.11)	1.30*** (0.12)
CAP ( <i>Certificat d'aptitude professionnelle</i> )	1.21*** (0.20)	1.19*** (0.16)	0.48*** (0.12)	0.54*** (0.13)	1.17*** (0.15)	1.07*** (0.16)	0.72*** (0.25)	0.74*** (0.14)	1.10*** (0.23)	1.24*** (0.21)	1.48*** (0.23)	1.42*** (0.18)	1.18*** (0.18)	1.19*** (0.16)
BEP ( <i>Brevet d'études professionnelles</i> )	1.13*** (0.20)	1.03*** (0.14)	0.98*** (0.11)	1.03*** (0.12)	0.95** (0.47)	0.74** (0.35)	0.86*** (0.26)	0.85*** (0.20)	1.34*** (0.24)	1.31*** (0.18)	1.30*** (0.20)	1.22*** (0.20)	1.74*** (0.25)	1.76*** (0.25)
Baccalauréat	1.71*** (0.15)	1.66*** (0.11)	0.81*** (0.20)	0.81*** (0.24)	1.37*** (0.15)	1.35*** (0.14)	0.97*** (0.14)	1.05*** (0.16)	1.64*** (0.18)	1.63*** (0.16)	1.90*** (0.19)	1.90*** (0.19)	1.85*** (0.19)	1.86*** (0.16)
Foundation degree <sup>a</sup>	2.08*** (0.15)	2.08*** (0.12)	1.00*** (0.16)	1.06*** (0.14)	2.14*** (0.20)	1.94*** (0.21)	1.17*** (0.26)	1.14*** (0.22)	2.72*** (0.28)	2.74*** (0.19)	1.90*** (0.25)	1.82*** (0.22)	2.14*** (0.22)	2.10*** (0.24)
Bachelor's degree	2.30*** (0.13)	2.26*** (0.10)	1.42*** (0.12)	1.49*** (0.13)	1.98*** (0.13)	1.89*** (0.13)	1.40*** (0.14)	1.39*** (0.12)	2.53*** (0.16)	2.58*** (0.13)	2.26*** (0.14)	2.16*** (0.11)	2.41*** (0.16)	2.41*** (0.12)
Postgraduate degree	1.81*** (0.21)	1.73*** (0.18)	1.15*** (0.23)	1.14*** (0.22)	1.74*** (0.18)	1.61*** (0.17)	1.39*** (0.18)	1.36*** (0.13)	2.20*** (0.27)	2.27*** (0.21)	1.98*** (0.18)	1.89*** (0.15)	1.62*** (0.23)	1.65*** (0.22)
Marital status (1 = married)	0.28*** (0.05)	0.25*** (0.04)	0.43*** (0.05)	0.47*** (0.06)	0.65*** (0.05)	0.63*** (0.05)	0.36*** (0.06)	0.38*** (0.06)	0.48*** (0.06)	0.49*** (0.06)	0.45*** (0.06)	0.45*** (0.07)	0.36*** (0.06)	0.41*** (0.05)

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**Table 10.8 (continued)**

Variable	Abidjan		Bamako		Cotonou		Dakar		Lomé		Niamey		Ouagadougou	
Speaks French (1 = yes)	0.06 (0.06)	0.06 (0.07)	0.21*** (0.06)	0.21** (0.08)	0.14** (0.06)	0.15* (0.09)	0.30*** (0.06)	0.32*** (0.07)	0.08 (0.07)	0.07 (0.07)	0.24*** (0.07)	0.24*** (0.08)	0.40*** (0.07)	0.45*** (0.08)
Speaks another language (1 = yes)	0.19** (0.07)	0.17*** (0.06)	0.13** (0.06)	0.08 (0.09)	0.36*** (0.07)	0.41*** (0.07)	0.34*** (0.07)	0.35*** (0.07)	0.04 (0.07)	0.01 (0.08)	0.09 (0.08)	0.17* (0.09)	0.32*** (0.08)	0.34*** (0.09)
Experience (years)	0.12*** (0.01)	0.13*** (0.01)	0.09*** (0.01)	0.08*** (0.01)	0.16*** (0.01)	0.15*** (0.01)	0.14*** (0.01)	0.14*** (0.01)	0.14*** (0.01)	0.15*** (0.01)	0.15*** (0.01)	0.15*** (0.01)	0.16*** (0.01)	0.14*** (0.01)
Experience squared	-0.002*** (0.00)	-0.002*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)	-0.002*** (0.00)
Public sector	0.69*** (0.10)	0.50*** (0.08)	0.33*** (0.07)	0.38*** (0.07)	0.27*** (0.09)	0.32*** (0.06)	0.78*** (0.09)	0.84*** (0.07)	0.64*** (0.10)	0.65*** (0.06)	0.49*** (0.08)	0.46*** (0.08)	0.66*** (0.08)	0.76*** (0.10)
Private sector	0.67*** (0.06)	0.65*** (0.06)	0.17*** (0.06)	0.20*** (0.07)	0.32*** (0.07)	0.34*** (0.07)	0.81*** (0.06)	0.83*** (0.06)	0.33*** (0.09)	0.33*** (0.11)	0.31*** (0.08)	0.30*** (0.09)	0.42*** (0.09)	0.47*** (0.10)
Father in agricultural sector	-0.08 (0.05)	-0.05 (0.06)	-0.11** (0.05)	-0.18*** (0.07)	-0.02 (0.05)	-0.06 (0.06)	0.05 (0.06)	0.01 (0.06)	0.02 (0.06)	0.03 (0.06)	-0.01 (0.06)	-0.02 (0.07)	-0.21*** (0.05)	-0.29*** (0.07)
Father in industrial sector	-0.22** (0.09)	-0.19** (0.10)	-0.06 (0.09)	-0.06 (0.12)	0.15 (0.09)	0.10 (0.12)	-0.11 (0.07)	-0.12 (0.08)	-0.04 (0.10)	-0.02 (0.13)	-0.19 (0.14)	-0.21 (0.21)	-0.32** (0.16)	-0.37* (0.19)
Father in commercial sector	-0.05 (0.07)	-0.02 (0.07)	0.10* (0.05)	0.11* (0.07)	0.06 (0.07)	0.01 (0.08)	0.01 (0.06)	-0.02 (0.07)	0.10 (0.09)	0.08 (0.12)	-0.13 (0.08)	-0.11 (0.12)	0.01 (0.08)	-0.03 (0.11)
Father was senior executive	0.35** (0.14)	0.35** (0.13)	0.41*** (0.10)	0.43*** (0.11)	0.28** (0.12)	0.19 (0.16)	0.26** (0.13)	0.27** (0.13)	0.17 (0.16)	0.18 (0.18)	-0.20 (0.16)	-0.23 (0.24)	0.24 (0.15)	0.21 (0.16)
Father was midlevel executive	-0.12 (0.09)	-0.18* (0.10)	0.15** (0.07)	0.17*** (0.06)	0.23*** (0.07)	0.25*** (0.07)	0.09 (0.09)	0.10 (0.09)	-0.01 (0.09)	-0.01 (0.11)	-0.05 (0.11)	-0.07 (0.10)	0.09 (0.12)	0.12 (0.13)

**Table 10.8 (continued)**

Variable	Abidjan		Bamako		Cotonou		Dakar		Lomé		Niamey		Ouagadougou	
Number of observations	4,239	4,239	4,052	4,052	4,736	4,736	5,430	5,430	4,245	4,245	3,701	3,701	4,471	4,471
R-squared	0.41	0.41	0.32	0.32	0.44	0.44	0.34	0.34	0.34	0.35	0.39	0.40	0.39	0.40
Wald test for selection correction terms		10.60*		11.00*		17.30***		5.54		28.00***		6.49		6.02
<i>Overidentification Wald tests</i>														
Father dummies <sup>b</sup>		3.86		8.07**		1.64		1.05		10.10**		2.03		1.63
Religion dummies		3.22		0.33		3.41		0.90		3.44		1.70		0.59
Nationality dummies		5.48		2.45		4.61		0.02		7.17		7.60		7.72

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

Note: Figures show uncorrected and corrected estimates. Figures in parentheses are standard errors.

a. University system derives from the French system, in which, until recently, second-year students could receive a diploma. This diploma is referred to here as the foundation degree.

b. Father was absent when individual was 15; father had no schooling; father schooling is missing.

\* significant at the 10 percent level, \*\* significant at the 5 percent level, \*\*\* significant at the 1 percent level.

does not strongly bias the estimated returns to education or that our control functions do not do much to correct for the type of selectivity that matters.

In Abidjan, Cotonou, and Niamey, the corrected coefficients are lower than the uncorrected coefficients, suggesting that migrants to these cities share unobserved characteristics that make their earnings higher than the host city average. The opposite is found in Bamako and Lomé. These results have no implications for migrants' positive or negative selection. Indeed, migrants could have lower than average earnings in their host city but still earn more than they would have in the capital of their country of origin. In order to check whether earnings differentials matter in locational choice, we need to estimate the model in its structural form.

Comparing returns to education shows large differences across cities. In Bamako, and to a lesser extent Dakar, returns to education seem much lower than in the other cities. The increase in returns by grades does not appear very steep either. In Bamako, having completed primary school yields an estimated increase in hourly earnings of only 23 percent over uneducated individuals, a much lower estimate than in Abidjan (about 55 percent). In all cities, the largest returns are for bachelor's degrees. The smallest increase is in Bamako (114 percent over uneducated individuals) and the largest in Lomé (227 percent).

### Structural Model of Residential Choice

Do earnings differentials affect locational choice? Table 10.9 presents the results of the conditional logit estimation (equation 10.1). With no correction for endogenous selection, the coefficient is small and weakly significant. Its size more than doubles and becomes very significant when we correct for endogenous selection, bringing support to the idea that individuals tend to locate in countries where their expected earnings are higher.

**Table 10.9** Structural Model Estimates of Individual Residential Choice in Seven Cities in West Africa, 2001/02

Model	Estimated value of $\alpha$
Uncorrected	0.31* (0.16)
Corrected	0.78*** (0.15)

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

Note: Figures in parentheses are standard errors.

\* significant at the 10 percent level, \*\* significant at the 5 percent level,

\*\*\* significant at the 1 percent level.

A second assessment of this notion is given by simulations that compare wages between origin and destination countries. We simulated these differences using the following procedure:

- Step 1: For each individual, compute the predicted value of the (log) average hourly income in each city.
- Step 2: For each individual, draw a value in the standard normal distribution.
- Step 3: For each individual  $i$  and city  $k$ , combine the results of steps 1 and 2 to compute the predicted value of the individual's (log) hourly income in city  $k$ , summing the predicted average with the random term multiplied by the estimated standard deviation of (log) wages in that city.
- Step 4: Repeat steps 2 and 3 100 times. For "movers," compute  $m$ , the proportion of individuals for whom the predicted hourly income is higher in their current city than in the capital of their country of origin. For "stayers," compute the average value of predicted hourly income in the cities in which they chose not to reside. Then compute  $s$ , the proportion of individuals for whom the average value of predicted hourly income is lower in the cities in which they chose not to reside than in their country of origin.

Table 10.10 shows the results of this exercise. For movers (stayers) in each city, it reports the proportion of individuals for whom  $m$  ( $s$ ) exceeds 50 percent. In Bamako, Cotonou, and Ouagadougou, our model does a good job of predicting that movers live in cities in which their hourly income is higher than in their city of origin. In Bamako in particular, income differentials seem to play an important role. The model also does a good job of predicting stayers in Abidjan, Bamako, Dakar, and Niamey. The model fails to predict the destination of movers from Dakar and Lomé and of stayers in Cotonou. The fact that it fails

**Table 10.10** Model Simulation Results of Moving and Staying in Seven Cities in West Africa, 2001/02

City	Percentage of movers for whom $m > 50$	Percentage of stayers for whom $s > 50$
Cotonou	85	1
Ouagadougou	90	24
Abidjan	50	59
Bamako	81	63
Niamey	23	83
Dakar	7	68
Lomé	8	31

Sources: Based on Phase 1 of the 1-2-3 surveys of selected countries (see table 10.1 for details).

Note:  $m$  = proportion of individuals for whom predicted hourly income is higher in current city than in capital of country of origin.  $s$  = proportion of individuals for whom average value of predicted hourly income is lower in cities in which they chose not to reside than in country of origin.

to predict the behavior of workers in some cities should not be surprising, as potential income differentials are not the only motive for migration. Given that income is just one factor among many, the ability of the model to predict workers' choice based on potential income differentials is surprisingly good.

For movers, we computed the difference between the predicted value of hourly earnings in the origin country capital and destination city; for stayers, we computed the difference between the predicted value of hourly earnings in the origin country capital and an average of the predicted value of hourly earnings that could be obtained in the six potential destination cities. We then computed the average value of these differences separately for movers and stayers. The difference is close to zero ( $-0.36$ ) for stayers, suggesting that for these people there is no real gain of moving abroad. In contrast, movers earned much higher hourly earnings abroad ( $-3.99$ ) than they would have earned had they stayed in their country of origin.

### **Robustness Checks**

We conducted several robustness checks. First, in the second stage of our estimation procedure, we ran a Heckman selection model using data on labor market participants and nonparticipants instead of an ordinary least squares regression on participants only. In the early estimations, because of the difficulty of controlling for both the endogenous selection of locational choice and labor force participation, we restricted the sample to labor market participants. This limitation is a potential source of bias in our estimates. The identifying variable in the Heckman selection model is whether the individual is married, which is assumed to influence labor market participation but not earnings. Results obtained in the third stage were not affected by this change, suggesting negligible biases. Second, we checked whether self-selected internal migration affected the observed returns to education. We found no evidence of selection bias. Third, as our results might depend on the set of conversion factors used to convert current CFA francs into purchasing power parity values, we reran the model using World Bank (2003) conversion factors. This modification did not change the results significantly.

### **Conclusion**

Our results shed light on migration flows within the WAEMU region. Despite the severe political crisis that began in 1999, Côte d'Ivoire remains the most important destination country in the subregion. Mali and Burkina Faso remain major labor-exporting countries, largely toward Côte d'Ivoire. Benin and Togo combine emigration and immigration.

Migrants tend to be less educated than nonmigrants, in both their origin and destination countries. Cross-border migration within the subregion thus seems to concern mainly people with low levels of education, who are more likely than

natives to work in the informal sector and receive lower wages. Not accounting for international migration in estimating returns to education yields upward biased estimates in three of seven countries and downward biased estimates in two others. However, disparities in returns to education between cities do not vanish, suggesting that country-specific amenities and other unobservable nonwage variables play important roles in the locational choice of individuals with different levels of education.

We also find that expected earnings differentials have a very significant effect on choice probabilities: everything else equal, people tend to live in cities in which their expected earnings are higher than elsewhere. Our sample is not a random sample of individuals from the WAEMU region, and we do not include all potential destinations. These caveats notwithstanding, our results on the locational choice of a large sample of West Africans suggest that individuals in developing countries do not always deviate from the predictions of the standard economic model.

## Notes

1. WAEMU includes eight countries: the seven under review in this chapter (Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, and Togo) and Cape Verde. ECOWAS is a larger group of countries. It includes all WAEMU countries as well as The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, and Sierra Leone.
2. Although Abidjan and Cotonou are not the administrative capitals of Côte d'Ivoire and Benin, we refer to them as capitals because they are the most important cities in economic terms (Cotonou is also the seat of government).
3. The civil war in Côte d'Ivoire started in September 2002, a few months after completion of the 1-2-3 survey.
4. The unemployment rates reported in tables 10.6 and table 1.6 in chapter 1 differ, for two reasons. First, table 1.6 covers only the active population, whereas table 10.6 includes inactive individuals. Second, table 10.6 is restricted to people 15–65, whereas table 1.6 covers everyone 10 and older.
5. Figures for Bamako and Dakar should be considered with great care given the small sample size.
6. All sampled individuals were born in one of the seven countries under review. We assume that they chose to live in one of the capitals of these countries; the model is built to analyze the determinants of this choice. Throughout the rest of the chapter, we distinguish between countries of origin and cities of destination or residence.
7. Indeed, according to UNESCO's (2005) *Education for All 2005 Monitoring Report*, which provides various indicators of the quality of education, none of the seven countries of concern stands out from the crowd. For instance, Benin ranks first when the quality of education is measured by the probability of being literate after six years of primary school but fourth when quality is measured by test scores and seventh when measured by the average teacher wage.

8. The PPP conversion factors were computed in 1998 by the Agence pour la Sécurité de la Navigation Aérienne en Afrique (ASECNA) and updated through 2001 using national inflation rates.

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AFRICA DEVELOPMENT FORUM



# Urban Labor Markets in Sub-Saharan Africa

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