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A POVERTY FORECASTING TOOL

A Case Study of Senegal

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DÉPARTEMENT DE LA RECHERCHE

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Abstract

Poverty reduction has become the focus of economic policy in many Sub-Saharan African countries. As a result, a need for new social indicators has arisen to monitor the application and effectiveness of Poverty Reduction Strategy Papers (PRSPs). In recent years, there have been renewed efforts to develop tools aimed at better understanding the channels through which PRSP measures affect the poor. The approach presented in this paper links macroeconomic models with representative household and micro household income data to measure the effectiveness of poverty reduction policies. In essence, this is a simple micro-accounting method that can be linked to the macroeconomic forecasting model (Jumbo), run by the AFD for the CFA Franc Zone. An output of the revenue forecast for each representative household is introduced into a simple micro-simulation model in order to obtain a yearly poverty indicator. The interpretation of the results, with the help of the macroeconomic environment described in the Jumbo model, allows for an analysis of the poverty outlook. After describing the method, data from the Senegalese household survey ESAM II is analysed and an overview of poverty in Senegal is given.

Résumé

La réduction de la pauvreté est au cœur des politiques économiques de nombreux pays d'Afrique subsaharienne. Il en résulte un besoin croissant de nouveaux indicateurs sociaux afin de suivre la mise en œuvre des programmes de réduction de la pauvreté (PRSP) et d'évaluer leur efficacité. L'approche exposée dans cet article, associe modélisation macro-économique et micro-simulations à partir de données relatives au revenu des ménages. Il s'agit d'une méthode de simple comptabilité micro-économique, reliée au modèle de projection macro-économique Jumbo utilisé par l'AFD pour les pays de la Zone franc. Les prévisions macro-économiques annuelles issues du modèle Jumbo permettent de déduire une prévision de l'évolution du revenu des ménages en fonction de leurs activités. Cette prévision est utilisée dans une seconde étape dans un modèle simple de micro-simulations pour obtenir un indicateur annuel de pauvreté. Une analyse de l'évolution de la pauvreté est ensuite possible grâce au cadrage macro-économique décrit dans le modèle Jumbo. Après une présentation de cette méthode, l'étude de cas appliquée au Sénégal propose une analyse des données de l'enquête ESAM II, enquête sénégalaise auprès des ménages, ainsi qu'un aperçu de l'évolution de la pauvreté dans ce pays.

1 Introduction

Each year, both donor groups and governments require a broad range of statistical indicators to monitor changes in poverty. The list of variables published in each country is very large and includes both macroeconomic and microeconomic data such as: the evolution of GDP per head, the contribution of primary sector production to total GDP growth, growth rates of domestic, import and rural prices, and literacy rates, access to healthcare and education. In general, these social statistics are obtained from national household surveys, which are both costly and time-consuming to produce. This paper is an attempt to fulfil the need of both governments and the donor community by describing a method for producing a statistical estimation of monetary poverty between two household surveys. The objective is severally: to enable discussions on the year-on-year implementation of Poverty Reduction Strategy Papers (PRSPs); to identify those parts of the population (by activity or location) whose situation has deteriorated during multi-year programmes; to suggest possible explanatory factors for this; and thereby, to allow corrections of the policy by redirecting efforts to this identified group. Clearly, those whose situation has declined should be the focus of enhanced redistribution policies.

Using the evolution of the macroeconomic environment described in the Jumbo forecasting model, the methodology outlined in this paper produces the best estimates of poverty rates and inequality indices between two household surveys. Developed by the Agence Française de Développement in 1995, for the past decade, Jumbo has been used to produce short-term economic outlooks and to facilitate comparative analyses of the Franc-zone countries. Its output informs the policy debates at the annual meetings of the Franc-zone Finance Ministers. By developing a method that links the two-year macroeconomic forecasts produced by the Jumbo model with microeconomic household data, this paper makes an original contribution to the literature on poverty monitoring.

While the methodology described here can be applied generally, in this paper, the focus is on Senegal. Senegal is particularly interesting as it is among the few West African countries with a possibility of meeting the Millennium Development Goals (MDGs). The next section explains our method and highlights the link between the micro data and the macro model. The macroeconomic model, Jumbo, is outlined briefly in Section 3 and Senegalese data is applied to it in Section 4. After describing the Senegalese household survey (ESAM II) and the macroeconomic situation, we then present the results by household category and by region, with a specific focus on Dakar. Section 5 concludes.

2 Method

A number of tools linking the macro and micro contexts have been developed to measure the impact of economic policies on revenue distribution. In general, these adopt a top-down approach, starting with the macro output and moving to the micro. Most macroeconomic models employed in these efforts are Computable General Equilibrium (CGE) models, which identify a small number of representative household groups. In these studies, analysis of changes in inequality focus on changes between the different groups. The purpose of linking macro CGE models to microsimulation models is to analyse the impact of exceptional events such as a crisis, an external shock or a major change in economic policy. In the absence of major changes to the macroeconomic framework, however, it is not the most practical way of estimating poverty.

This paper differs by linking a microsimulation module to a forecasting model. In contrast to CGE models, which describe a new state of the economy at a non-specified date, our forecasting horizon is well defined. This enables us to monitor poverty and inequality indicators between two successive household budget surveys. By examining the composition of growth described in the macro forecasting model we are able to explain changes in poverty and to measure the effectiveness of poverty reduction policies. This has clear implications in terms of meeting MDG monitoring requirements.

It is relatively simple to link the Jumbo model to micro household income data, as representative household groups are identified in Jumbo by source

of income. These are: rural sector, rural groundnut sector, formal sector urban, informal sector urban and public sector. Data collected by the national household surveys are first sorted into these groups. From a two-year Jumbo forecast, real growth rates of per capita consumption and disposable income are obtained for each household grouping. These growth rates are then applied to the income and consumption of each household in the survey, thereby giving a new vector of consumption.

Specifically, the methodology entails several steps:

- Data from the household survey are first sorted into the household income categories defined in the macro model. The information supplied regarding the primary source of income of the household head was the first criterion for sorting. Thereafter, information regarding other sources of income was used to refine the results and take into account a part of heterogeneity in household income.
- We extract from the macro model the revenue growth by household category. In order to calculate the nominal growth rate per capita, we add a simple demographic model with different hypotheses for each household category. The last two global population censuses were used for this.
- These growth rates are then separately applied to the per capita consumption of each individual in the household survey.
- Using the change in consumer prices given by the macro model, we then adjust poverty lines and calculate the new income distribution and a poverty indicator.
- The poverty indicator can then be analysed over the three-year period (of which, the first year is observed and a two-year is forecasted).

A number of assumptions underlie this approach. First, per capita consumption in the household survey is adjusted to the macro level, but the employment structure is not. This implies that changes in the labour market affect poverty and income distribution only through relative income changes induced by macro level changes in the employment structure. When these changes are transferred to the household survey, it is assumed that each individual remains in his initial activity. Though this assumption is limiting, these constraints are mitigated by the short horizon of the forecast period (two years). This makes it somewhat safer to assume that there will be relatively few structural changes in the economy and that labour allocation to the identified revenue sources will remain stable. In the same way, we assume that the urban-rural distribution remains stable at the macro level.

While there are benefits to building a labour-market module in an integrated macro-micro model, this would require sophisticated data that can be obtained only with great difficulty, such as detailed labour market statistics and data reconciliation on the household account. Nor would an over-detailed specification be relevant in African Franc-zone countries where statistics are more limited (particularly on the demand side, as national accounts are built on an aggregated supply approach (ERETES)).

3 Jumbo:

A Macroeconomic Forecasting Model for the Franc Zone

Developed at the AFD, the Jumbo macroeconomic and financial forecasting model is a simple Keynesian-type model. Based on an input-output table, it is a multi-sector model that can be used for countries possessing sufficiently detailed national accounts. Mainly applicable to the Franc-Zone countries (except the Comores), the model can be used to produce two-year macroeconomic national forecasts. It can also produce syntheses for the West African Economic and Monetary Union (UEMOA), the Economic and Monetary Community of Central African States (CEMAC) and for the entire Franc Zone. The initial aim in developing Jumbo was to facilitate close macroeconomic monitoring by assembling rapid accounts and short-term forecasts. It was also intended to enable AFD participation in economic policy debates in Franc-zone countries.

In Jumbo, tradable GDP is determined by demand components, and some behavioural

relations are integrated into the model, with for example, an econometric estimation of each national consumption function. The model was initially based on a two-sector economy: a tradable sector, which produced a single composite good destined for consumption, investment and exportation, and a non-tradable sector (administration). Over the decade since it was initially developed, the model has evolved to include other sectors (such as the oil sector). The principal characteristics of the model are as follows: import and export international prices are exogenous in hard currency. Tax receipts are endogenous, but the taxation rate is exogenous. Current public expenditure is considered as a variable of economic policy and is exogenous in value. Interest paid outside of the country is calculated by the model and varies according to the exchange rate hypothesis. Credit to the public sector and to the rest of the economy is exogenous. Hypotheses on international primary goods prices are drawn from the last IMF World Economic Outlook.

Jumbo model forecasts are published annually in April prior to the meeting of the Finance Ministries of the Franc-Zone countries. The Rapport Jumbo presents and comments on a short-term (two-year) growth forecast. This independent forecast can then be compared with those of national governments, central banks, the IMF and the OECD.

There are several advantages to Jumbo. First, it reprocesses and homogenises national statistics to produce a long-term macroeconomic database (over 10 years, and up to 20 years for certain variables) of the Franc-zone countries. This makes comparative analyses between countries and regional summaries possible. Variants can also be run on Jumbo, either on one country or on the entire region. For example, the relative impact of a lower dollar or of an increase in the price of oil can be measured for sets of countries or for the UEMOA or CEMAC. More particularly in terms of this paper, as most of the output from the Jumbo model is determined by the demand components, the household consumption and income variable is particularly developed and regularly re-estimated. This makes Jumbo well suited for a microsimulation exercise.

In Jumbo, households are broken down into several representative household groups. Public wages are taken from the consolidated operations of the central government; private wages and urban informal revenues are estimated and linked to global economic activity; and urban inflation, and rural incomes are divided into those from subsistence products, and those from exported goods (mainly groundnut and cotton products in Senegal).

4 A Case Study of Senegal

This section first summarises the 2002-2004 Senegalese macroeconomic outlook obtained from Jumbo, and published in the April 2004 Rapport Jumbo. After these data are introduced to the microsimulation model, the poverty outlook for a poverty line set at $1 is given.[1]

4.1 Senegal Economic Outlook 2002-2004

The Senegalese economy slowed considerably in 2002, due to a sluggish agricultural sector. Primary sector production revived in 2003, and this should lead to increased agricultural revenues in 2004. Growth in the tertiary and secondary sectors was robust throughout the period, sustained by a government policy of increasing the number of public sector positions (see Table 1).

The contribution of primary sector growth to the country's growth remains high, although the sector's importance to the economy is diminishing. The sharp slowdown of GDP growth experienced in 2002 was essentially due to the poor agricultural harvest of that year.

Primary sector production fell by 20% in 2002, owing to a 30% drop in agricultural production due to a cold winter followed by a severe drought in

[1] *All poverty line figures are stated in 1985 dollars.*

summer. The groundnut sector was hardest hit, registering a 70% drop (see Figure 1). In this traditional staple of the economy, the effects of disrupted markets in the wake of privatisation compounded the effects of unfavourable meteorological conditions.

Crop failures cut rural incomes in early 2003, though farm production recovered during the year, reviving hopes for strong growth in rural income in 2004. In 2003, groundnut production was up by 70% (but still below the long-term annual average) and the sector's structural problems continue to undermine the sector's potential growth. Revenues from groundnut production thus, grew once again in 2004, following the sharp drop in 2003. However, according to Jumbo estimates, they remain below those of other agricultural sectors. This could be attributed to an overestimation of autoconsumption or an overvaluation of food crops. Nonetheless, this is confirmed by the household survey: the poor are particularly concentrated in groundnut production regions. Reforming the groundnut sector has thus become a national priority targeting the national subsidiary, and encouraging agricultural diversification.

Overall, with the exception of the agricultural sector, the economic outlook for 2004 is more robust than it has been since 2000. After its sharp rebound in 2003, growth in the agricultural sector has once again slowed, although the effect on the global outlook is partially mitigated by increased consumption linked to the improved 2003 agricultural revenues. A locust plague infected the north of the country and it is possible that this could destroy part of rural production in 2004. The uncertain management of the privatisation of the groundnut parastatal company, Sonacos, scheduled for late 2004 or early 2005, makes farmers vulnerable to losing their market for the crop. Groundnut production has also been hampered by difficulties stemming from purchasing problems that have been ongoing since the 2001/2002 season. The effects of these developments on agricultural revenues will only be felt in 2005, beyond the horizon of this study.

In the rest of the economy, growth was both strong and more stable. As industry, construction and services continue to grow steadily, revenues should gradually increase in the private sector. The government's large public-service recruitment programme (primarily in education, health and security) should also sustain growth. This has also led to increased public sector labour revenues. Furthermore, consumption is largely fed by remittances from abroad, though it is difficult to measure their impact on household revenue through the household survey.

Table 1 - Annual Growth and Demand Composition in Senegal 2001-2004

%	2001	2002	2003	2004
GDP (Jumbo estimate)	***4.7***	***1.3***	***5.0***	***5.8***
Imports	*11.4*	*6.1*	*2.5*	*6.6*
Consumption	*7.5*	*2.4*	*2.8*	*6.8*
Public	*8.2*	*1.7*	*6.4*	*5.0*
Private	*7.4*	*4.7*	*2.3*	*7.1*
Investment	*3.2*	*8.2*	*8.5*	*6.4*
Public	*8.8*	*24.8*	*14.9*	*7.2*
Private	*7.0*	*2.0*	*5.0*	*6.0*
Exports	*7.1*	*2.8*	*-12.2*	*3.9*
Primary goods	*10.8*	*4.5*	*-22.5*	*5.9*
Others	*4.8*	*1.7*	*-5.3*	*2.7*

Source: Jumbo (April 2004).

4.2 Forecasting Poverty Trends in Senegal: Method

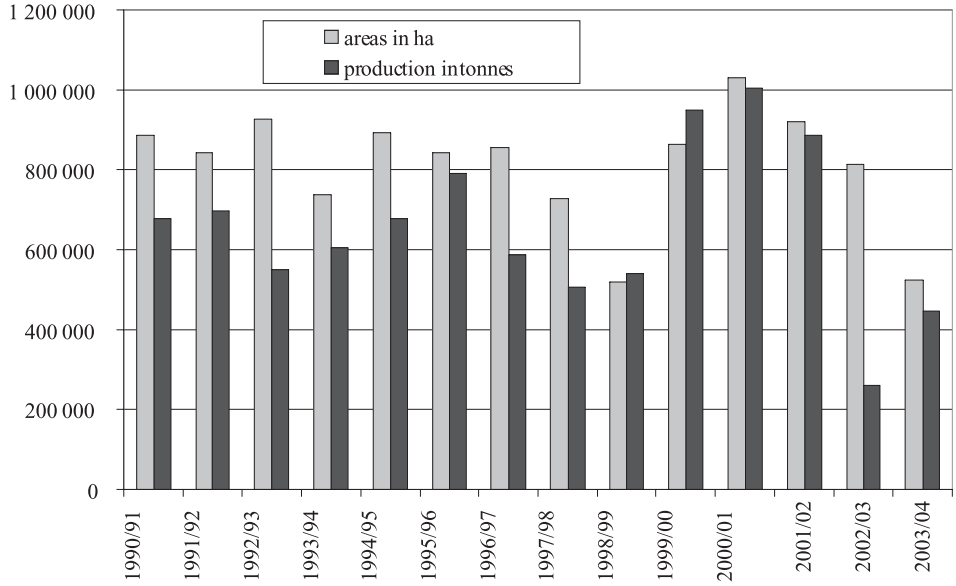
An initial macroeconomic study aimed at estimating monetary poverty from the Jumbo model (Cogneau 2003), indicated that Senegal should be in a position to meet some of the Millennium Goals. This study was based on a simple model that assumed a constant level of inequality in revenues, and a lognormal distribution of revenues in each Franc-zone country. Compared with other Sub-Saharan African countries, particularly in the Franc Zone, it would appear feasible to significantly reduce certain aspects of poverty in Senegal in the medium term. Reaching this goal, however, requires a close monitoring of poverty indicators.

This paper aims to produce more detailed projections suppressing two hypotheses: (i) log-normal income distribution; and (ii) constancy in inequality. This new method translates the outcome of the Jumbo model into a micro-accounting of household income from the national survey. This part of the study draws on the Senegalese Household Survey II (ESAM II), which is the most recent report of income distribution in Senegal. The first advantage of our method is that the hypothesis of log-normal distribution used in the first stage can be completely eliminated. Indeed, even if household income increases at a constant rate, thus leaving inequality unchanged, poverty indicators can be calculated on the basis of the true initial distribution of income.

A typology of households was established in the ESAM II survey based on the activity of the head of household. This identified five categories:
- Self-employed households in the rural sector
- Self-employed households in the non-rural sector
- Households employed in the private sector
- Households employed in the public sector
- Households with no professional activity

Likewise, Jumbo identified five categories of revenue for which it produced growth forecasts:
- Rural income (groundnut, cotton)
- Rural income (subsistence products)
- Income of individual entrepreneurs in the urban sector
- Salaries from private sector
- Salaries from public sector

Figure 1 - Groundnut Production and Cultivated Areas in Senegal, 1990-2004



Source: ministère de l'Agriculture, Direction des statistiques.

While the latter three revenue categories can be easily identified in the household survey, certain assumptions regarding rural revenues had to be made. Groundnut and cotton production in Senegal is highly concentrated in certain regions. We therefore assume that households employed in the rural sector in these regions earn the majority of their income from these crops.

In order to access per capita income, we need to develop a demographic model for the Jumbo revenue categories. This was accomplished based on the results of the latest global population census (2002).

Per capita income growth from the macro model is applied to households, based on the head of household's activity. We also differentiated the activity of each individual in the household, which gave similar results. In the case of the ESAM II survey in Senegal, only qualitative data on revenue source is available. As a result, strong assumptions regarding the revenue distribution in the household were made. If two individuals within a household declared a source of revenue, two-thirds were assigned to the household head, and one-third was assigned to the second earner. If three declared, one-half was assigned to the household head, and one-quarter to each of the two secondary earners.

From this data, several widely-accepted poverty indicators were calculated. The first indicator was the incidence of poverty (P0), which "describes the percentage of the population whose per capita income, or expenditure spending are below the poverty line, that is, the population that cannot afford to buy a basic basket of goods" (Coudouel *et al.*, 2000). The Poverty Gap Index (P1) reports the mean proportional poverty gap across the entire population. It provides a combined measurement of the incidence and depth of poverty. Lastly, the Poverty Severity Index (P2) provides a weighing to the poverty gap (more weight to the very poor than to the less poor). It is the average value of the square of depth of poverty for each individual. As such, poorest people contribute relatively more to the index.

Table 2 - Senegal 2002:
Household Poverty for $1 and $2 Poverty Lines

$1 Poverty Line				
%	**P0**	**P1**	**P2**	**Gini**
Total population	29.08	7.69	2.89	0.48
Non workers	25.16	6.62	2.46	0.44
Salaried from the public sector	4.31	1.19	0.41	0.42
Salaried from the private sector	10.61	2.94	1.21	0.50
Individual entrepreneurs in the urban sector	24.23	6.56	2.55	0.46
Rural non salaried (groundnut, cotton)	57.24	15.56	5.88	0.26
Rural non salaried (food crops)	41.82	10.71	3.93	0.32
$2 Poverty Line				
%	**P0**	**P1**	**P2**	
Non workers	64.40	26.57	13.90	
Salaried from the public sector	32.23	9.64	4.03	
Salaried from the private sector	43.37	14.57	6.96	
Individual entrepreneurs in the urban sector	66.34	26.86	13.98	
Rural non salaried (groundnut, cotton)	94.79	49.08	28.40	
Rural non salaried (food crops)	88.09	41.19	22.43	

Source: AFD calculation.

4.3 ESAM II Results and Poverty Forecast in Senegal 2003-2004

While ESAM II reported a 2002 global poverty rate of 29.1% of the total population, vast differences in the situation of each household group existed. Inequality, as measured by the Gini Coefficient is relatively high, at 0.48. Table 2 below shows the ESAM II results for a poverty line of $1 and $2.

Poverty is lowest for salaried public sector households, and deepest for households dependent on groundnut production. Nearly 95% of this latter group falls below the $2 poverty line. It is also the most homogeneous segment of the population, with a Gini Coefficient of 0.26. These characteristics indicate that the sector should be the object of renewed poverty reduction efforts. The reform of groundnut production may be a move in the right direction, provided a sound policy of reorientation and diversification is carried out.

Rural incomes are concentrated around the $1 poverty line. These results are thus highly sensitive to the definition and update of the poverty line and new estimates of inflation can significantly increase the number of households crossing the poverty line. Thus, controlling inflation should clearly form an essential part of a poverty reduction strategy.

After running the microsimulation, we find that poverty increased in 2003 (see Table 3), which can be attributed to the poor agricultural harvest of 2002. As in most African countries, poverty in Senegal is

Table 3 - Senegal 2003 - 2004:
Forecasted Household Poverty for a $1 Poverty Line

2003 (%)	**P0**	**P1**	**P2**
	32.77	9.69	3.99
Non workers	27.88	7.64	2.93
Salaried from the public sector	4.31	1.14	0.39
Salaried from the private sector	10.47	2.81	1.15
Individual entrepreneurs in the urban sector	26.48	7.29	2.88
Rural non salaried (groundnut, cotton)	86.43	35.68	17.73
Rural non salaried (food crops)	42.53	11.00	4.05

Source: AFD calculation.

Table 4 - Senegal 2004:
Forecasted Household Poverty for a $1 Poverty Line

2004 (%)	**P0**	**P1**	**P2**
Total population	29.64	8.06	3.09
Non workers	25.21	6.71	2.50
Salaried from the public sector	3.83	0.86	0.27
Salaried from the private sector	9.45	2.57	1.05
Individual entrepreneurs in the urban sector	24.30	6.61	2.57
Rural non salaried (groundnut, cotton)	69.68	22.92	9.63
Rural non salaried (food crops)	40.66	10.04	3.64

Source: AFD calculation.

concentrated in rural areas and is directly linked to the quality of the previous farming year. As agricultural production was disastrous in 2002/2003, it is not surprising that national poverty increased in 2003 (by nearly four points between 2002 and 2003: from 29.1% to 32.8% for a $1 poverty line). This deterioration particularly affected rural households, especially those households reliant on groundnut production. On the other hand, there was an improvement in urban sector revenues.

It is clear that our method is liable to overestimate the effect of the bad groundnut harvest on the revenues of groundnut producers. In order to simplify the model, we do not account for the fact that groundnut farmers could cultivate several crops and thus have a more diverse source of household income. Indeed, if a groundnut farmer is risk adverse he would most likely devote a parcel of his land to food crops. As this type of behaviour is not taken into consideration here, some care is needed in commenting on the volatility of poverty among this sector of the population.

Following the good farming year of 2003/2004, we should observe a decrease in poverty in 2004. The Gini Coefficient continues to rise though, particularly in urban areas, and in Dakar. This is attributable to large public and private sector wage increases that outstripped those of individual entrepreneurs and the informal sector.

Given government moves towards decentralisation and redistribution policies, it is useful to analyse poverty regionally (see Table 4). Senegal is divided into ten regions with very different characteristics. The country's government structure is currently under transition with several government functions being moved to the regions.

Poverty is lowest in Dakar, though this is also the region with highest inequality. Set at $1, the poverty rate is very low, though this may not be truly representative. The national household survey statiscal analysis was based on a poverty line in Dakar of above $3, given the high cost of services in the city (water, transportation, etc.). A policy of poverty reduction could aim to improve these services and to reduce their cost. For example, rationalising public transportation in the Dakar region could significantly improve the lives of those travelling long distances to work. A large-scale social housing programme would also alleviate pressure on the housing sector.

Other regions appear to be more homogeneous with lower Gini Coefficients. But differences exist,

Table 5 - Senegal 2002:
Regional Poverty for a $1 Poverty Line

%	P0	P1	P2	Gini
Dakar	3.6	0.6	0.2	0.46
Ziguinchor	51.9	16.6	7.1	0.37
Diourbel	39.7	9.7	3.5	0.37
Saint Louis	28.9	6.5	1.9	0.33
Tamba	43.2	11.2	4.0	0.28
Kaolack	53.2	16.1	6.4	0.38
Thies	23.9	5.5	1.9	0.39
Louga	22.2	5.1	1.8	0.32
Fatick	29.3	5.9	1.7	0.27
Kolda	50.0	16.1	7.1	0.32
Senegal	29.1	7.7	2.9	0.48

Source: AFD calculation.

with the poverty rate (for a $1 poverty line) ranging from 22.2% in Louga, to 53.2% in Kaolack.

The groundnut production areas of Kaolack and Fatick suffer from high poverty. Nationally, the south and east are also poorer than the north and west while the Sahel regions of Saint Louis and Louga are above the country wealth average.

As mentioned above, the poor 2002/2003 agricultural year, resulted in a national increase in poverty in 2003 (see Table 5). This rebounded to 2002 levels in 2004, though rural areas dependent on groundnut production (Kaolack and Fatick) continued to suffer. The rise in poverty in these regions justifies the 2003 emergency programme. There was also a slight deterioration of the Gini Coefficient between 2002 and 2004 due to the stagnation (or decrease) of rural revenues while private and public wages rose.

The Dakar region is interesting in that it shows a very different situation. Table 6 below gives the Dakar poverty rate for a $2 poverty line. This is a more realistic poverty line for the region, as relative prices, particularly for services (housing, transport etc) are higher than in the rest of the country.

From 2001 to 2004, the poverty rate at the $2 poverty line decreased from 30.9% to 29.9%. While those households reliant on private sector wages experienced a continuous improvement in their situation, other households improved mainly in 2004. The situation of those households dependent on public sector salaries only improved in 2004 with the programme of public wage increases. The households of non-salaried workers, both in the primary and tertiary sectors, experienced a deterioration of their situation in 2003. This revived in 2004.

Table 6 - Senegal 2003 and 2004:
Forecasted Regional Poverty Incidence (P0) for a $1 Poverty Line

%	2003	2004
Dakar	4.1	3.4
Ziguinchor	54.4	50.4
Diourbel	42.9	39.0
Saint Louis	30.7	27.6
Tamba	45.7	42.8
Kaolack	66.5	58.1
Thies	24.9	23.5
Louga	24.0	21.4
Fatick	43.6	35.0
Kolda	52.3	49.1
Senegal	32.8	29.6

Source: AFD calculation.

Table 7 - Household Poverty in Dakar (2002-2004) for a $2 Poverty Line

2002			
%	P0	P1	P2
Total population	30.9	7.8	3.0
Non workers	30.6	7.7	2.9
Salaried from the public sector	18.2	4.1	1.2
Salaried from the private sector	25.8	6.5	2.4
Individual entrepreneurs in the urban sector	35.4	8.8	3.4
Rural non salaried (food crops)	53.5	21.2	10.1
2003			
%	P0	P1	P2
Total population	32.9	8.6	3.3
Non workers	34.2	9.0	3.4
Salaried from the public sector	18.2	3.8	1.1
Salaried from the private sector	23.9	6.2	2.3
Individual entrepreneurs in the urban sector	38.1	9.9	3.9
Rural non salaried (food crops)	55.5	21.5	10.3
2004			
%	P0	P1	P2
Total population	29.9	7.6	2.9
Non workers	30.6	7.8	2.9
Salaried from the public sector	14.1	2.7	0.7
Salaried from the private sector	22.0	5.6	2.0
Individual entrepreneurs in the urban sector	35.6	8.9	3.4
Rural non salaried (food crops)	49.7	20.5	9.7

Source: AFD calculation.

5 Conclusion

The macro-micro linkage was recently developed to quantify poverty reduction policies. The Poverty Reduction Strategy Paper has changed monitoring processes in many African countries, making them more participatory and consensual. As poverty reduction policies exist throughout Sub-Saharan Africa, the need for social indicators and statistics is essential.

This paper is an attempt to build poverty estimates, for household categories and regions, using a simple microsimulation model linked to a macroeconomic forecasting model. The benefit of this approach is that it provides governments with an overview of the evolution of poverty. Compared to a package of numerous different statistics, this is significantly easier to communicate, both to the general population and to the press.

Because our method provides yearly estimates of poverty, it allows us to monitor short-term fluctuations in poverty that would not necessarily be evident in structural analyses. This method also helps us to analyse the evolution of poverty between two different household surveys. These short-term fluctuations in poverty can be partly explained by the economic environment described in Jumbo. It should also be remembered that the picture of poverty painted from a specific household survey provides us with a static view at a given point in time.

However, in painting a volatile picture of the evolution of poverty, it could enforce the idea that the poverty rate we calculate with a specific household survey is very dependant of the period when the survey has been conducted. The long-term evolution of poverty could be explained by both the structural elements highlighted in development literature, and also by short-term variables as suggested in this paper.

An advantage of the macro-micro method described in this paper is its simplicity. It can easily be conducted in every country in which a Jumbo model is running. While it was first tested in Senegal, we are already planning to apply the method to micro data from Mali, Burkina Faso and Benin. Once complete, we will have a basis for comparing these countries and for obtaining a national indicator of poverty within the framework of monitoring the Millennium Development Goals.

Other improvements to the method will consist of introducing a more detailed labour-market module. Our method could be extended by taking into account household labour-supply behaviour and the evolution of the employment structure. In directly linking the macro model to observations from a household income survey, our simple, micro-accounting approach does not explicitly account for within-group heterogeneity. As the analytical horizon is limited to two or three years, we assume that short-term variations are minor. Likewise, our method neither explores the consequences of a deep shock to the economy nor the possibility that household behaviour varies considerably during the two-year period. An extension of the model with a labour-market module could also include an extended forecast horizon.

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