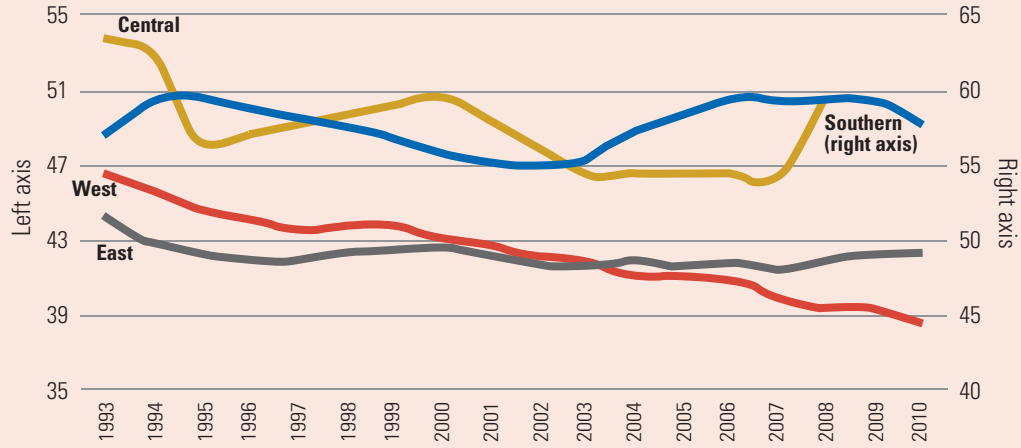
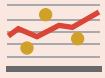
What drives within-country inequality trends in sub-Saharan Africa?

West Africa outperforms other SSA regions in reducing income inequality



Immediate and underlying causes of inequality in SSA

Immediate causes



The pattern of growth matters. In particular, a rise in land yields and manufacturing reduces inequality or keeps it low, but growth in mining or oil increases it.

Improved distribution of production assets, including human capital (e.g. secondary and tertiary education), reduces inequality.

Policies aimed at reducing fertility rates, as implemented in Ethiopia and Rwanda, could be equalising.

Underlying cases

Progressive public policies such as a rising share of direct taxes in total revenues, improved and effective social spending and stable prices and exchange rate – are equalising.

Improved migrant remittances are equalising while foreign direct investments (FDIs) are concentrated in mining are disequalising.

Political and health shocks – such as war intensity and HIV/AIDS incidences – raise inequality.

16 An Econometric Investigation of the Causes of the Bifurcation of within-Country Inequality Trends over 1991-2011 in sub-Saharan Africa

GIOVANNI ANDREA CORNIA[1]

16.1 Introduction

The inequality issue has recently received growing attention in SSA from research, policy and political perspectives. In fact, while inequality is a key determinant of poverty and most other SDGs, its documentation, the analysis of its determinants and the debate on how to reduce it have been limited to date. The main reasons for this are the exclusive emphasis placed on growth by past development strategies, limited data availability and the heterogeneity of inequality levels, trends and determinants in the region. In particular, the picture that emerges from the review conducted in Chapter 2 for 1991-2011 points to a divergence of national inequality trends. The theoretical explanation of this divergence and the related empirical evidence have been discussed in Chapter 15, while other chapters analyse specific aspects of this problem. This chapter, in turn, focuses on econometrically testing the working hypotheses about the inequality determinants formulated in Chapter 2, explored on microdata in Chapters 12 and 13 and examined in macro and panel models in several other chapters of this book. The econometric test is conducted on the 29 countries included in the IID-SSA dataset, which covers 81.8 per cent of the African population and a greater share of its GDP. Thus, its conclusions can be considered to apply broadly to the region as a whole.

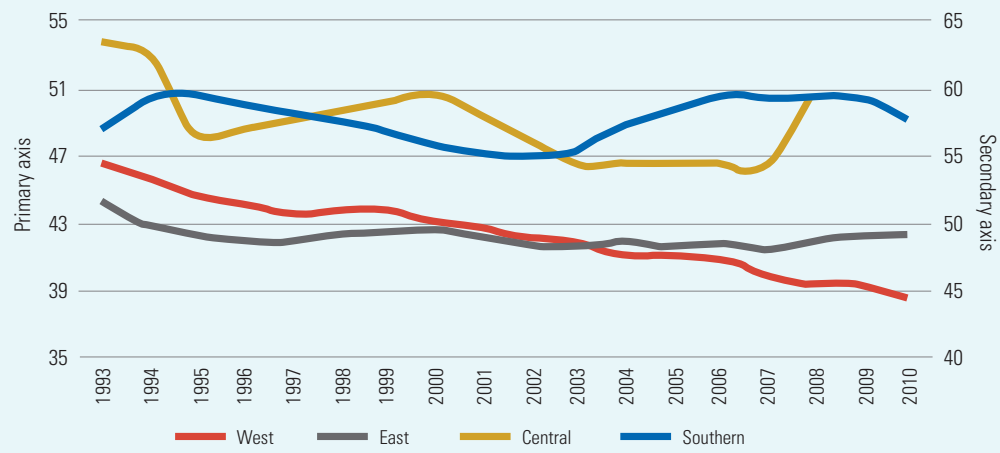
While the econometric test presented in this chapter is consistent with the theoretical approach discussed hereafter, it is important to remember that, as noted in Chapter 15, the Gini in the IID-SSA dataset, as well as those of any other inequality dataset, are a lower-bound estimate of the true but unobservable Gini. If the distance between the IID-SSA Gini and the true Gini remains constant over time and across countries, such distortion remains constant. Things may

[1] The author would like to thank Bruno Martorano for his help in building the database used in this chapter, for contributing to the regression analysis, and for his comments on a prior draft of this chapter. He would also like to thank Haroon Borat, Francois Bourguignon, Francisco Ferreira and Ayodele Odusola for discussing the structure and some aspects of this chapter. Many thanks also go to an anonymous referee who reviewed a prior draft of this chapter and people who commented on a PowerPoint version of this chapter presented during the UNDP consultation with field staff and economists at headquarters (New York, 8 April 2015), the joint UNDP-World Bank workshop on Inequality in sub-Saharan Africa (10 April 2015, Washington, D.C), the 30th Anniversary WIDER Conference (17-19 September 2015), the second annual conference on development economics of the Italian Development Economists Association (Florence, 24-25 September 2015) and the 10th African Economic Conference, "Addressing Poverty and Inequality in the post-2015 Development Agenda" (Kinshasa, 2-4 November 2015).

be more complex if the Gini's measurement bias varies over time, as this may reduce the precision of the regression parameters' estimates. The regression results need therefore to be interpreted with caution, ensuring that they are consistent with a well-articulated theoretical framework. Second, the use of nationwide data for the inequality determinants may not make it possible to capture effects that are observable at the microeconomic level. This is the case, for instance, of the impact of population growth and dependency rates that are statistically significant in microeconometric studies but not in macroeconometric ones. The interpretation of parameters estimated on macro panels thus needs to be complemented with the results of microanalyses. Finally, as discussed in Chapters 12 and 15, the Gini of average household consumption expenditure per capita derived from standard Household Budget Surveys (HBSs) does not make it possible to capture all types of inequality, in particular gender and ethnic inequality. Economic theory and the few microeconometric studies focusing on gender and ethnic inequality show that these two factors help explain the level and changes of the distribution of inter-personal consumption per capita much better than the standard HBS. The existing evidence suggests, however, that the impact of the gender and ethnicity bias on the interpersonal distribution of income is relatively stable over time, so that the Gini underestimation introduced by the analysis of the intra-household income distribution is likely to be fairly constant over time. In any case, the formulation of realistic policy recommendations addressing these problems requires relying also on ad hoc studies in these fields and on a solid economic theory.

Chapter 2 has shown that over the 2000s, inequality fell in 17 countries and rose in 12. In turn, figure 16.1 describes a clear regional pattern in inequality trends. In West Africa, inequality fell steadily in nine (mostly agrarian) economies out of 12, while a modest decline was recorded in East Africa. In contrast, Southern Africa and Central Africa have shown a rise since around 2003. Thus, since the early 2000s, there has been a regional divergence in inequality trends, as most low-inequality nations experienced a decline and the high-inequality nations experienced a rise or stagnation at high

FIGURE 16.1 Trends in unweighted average regional Gini, 1993-2010



Source: Author's elaboration on IID-SSA.
Note: Primary axis is for Central, East and West Africa, while the secondary axis is for Southern Africa.

TABLE 16.1 Gini coefficient mean and dispersion measures of household consumption per capita, 29 countries, 1993-2010

	1993	2000	2005	2010
Gini mean (unweighted)	47.5	45.5	43.8	43.5
Standard deviation	8.8	7.0	7.7	9.4
Coefficient of variation	0.185	0.154	0.176	0.216

Source: Author's elaboration on IID-SSA.
Note: The Gini index for 1993 refers to 25 out of 29 countries.

level. As a result, while the average unweighted Gini for SSA declined, its standard deviation and coefficient of variation rose since 2000 (table 16.1). This suggests that the heterogeneity of country inequality, originally linked to land tenure systems and the endowment of oil/mining resources, has become more acute.

16.2 Theoretical framework and factors affecting consumption inequality in SSA

The analytical framework presented below distinguishes between immediate and underlying causes of inequality. In the case of SSA, the analysis of the immediate determinants first emphasises the 'between sectors' inequality (due to sectoral differences in the factor-intensity of production and intra-sectoral heterogeneities) and then the 'within sector' inequality (focusing on the distribution of production factors within each sector). It then focuses on the role of demographic factors (population growth and dependency rates). The underlying causes of inequality, in turn, are those that affect the immediate causes or, in some cases, influence inequality directly. They generally include exogenous changes in policies (e.g. taxation and social expenditure), global economic changes (terms of trade, remittances and FDI), and technological and health shocks. Finally, they include 'democracy' and 'governance', which affect the efficiency and equity of public policy. Given the short post-colonial history of most African states, governance and democracy are still in their infancy, although gains have been shown in these areas that can perceptibly improve inequality.

16.2.1 Immediate causes of changes in consumption inequality

The immediate causes of inequality concern the rate of growth, the pattern of growth that affects 'between sector' inequality and population issues.

a) **GDP per capita growth rate, growth pattern and between-sector inequality.** The growth rate of GDP per capita can be reasonably considered a key immediate determinant of household consumption per capita since, without changes in the production structure, faster GDP/c growth increases labour absorption, reduces underemployment and may increase the incomes of the poor, with potentially favourable effects on inequality. However, figure 16.2 shows that there is no statistically significant relation in SSA between the yearly values of these two variables, both for the 29 sample countries and the years 1990-2011 (top panel), as well as for the two subsamples for the 1990s and 2000s (central panels), and the two subgroups of falling and rising

inequality countries (bottom panels). Given the heterogeneity of growth patterns in SSA, it is evident that growth per se did not affect inequality on average. Figure 16.2 also implicitly rejects the possibility that growth affected inequality as suggested by the Kuznets curve, since most of the 29 countries in the panel are low-income and should, in principle, show a rise in inequality corresponding to GDP/c growth.

Given the structural heterogeneity of the African economies, the 'pattern of growth' of GDP/c (i.e., its composition) matters more than the 'rate of growth'. When growth occurs in sectors characterised by high asset concentration and high capital- and skilled-labour intensity, such as mining, FIRE, and the public sector, overall inequality rises (see Chapter 2, figure 2.4). In contrast, inequality falls or remains stable if growth takes place in labour-intensive manufacturing, construction and agriculture (except if land concentration is high).

The key question, then, is, how has the economic structure evolved over 1990-2011? Rostow's (1962) theory on the stages of economic development and subsequent work by Rodrik (2013) and others suggest that after land yields rise above subsistence, surplus rural labour is shifted towards manufacturing, utilities and urban services. This shift facilitates industrialisation as well as the development of banks, insurance and transport companies and the public administration. Indeed, when income per capita rises above subsistence, it increases consumer demand for simple manufactured goods, the production of which is generally labour-intensive. Only after the demand for manufactured goods and related services has been saturated and the state of mass consumption reached does one observe a decline in the value added share of manufacturing and a rise in that of services, including personal and leisure services, a phenomenon often alluded to as 'tertiarisation'. In practice, the development pattern of each country varies according to its initial factor endowments and other characteristics.

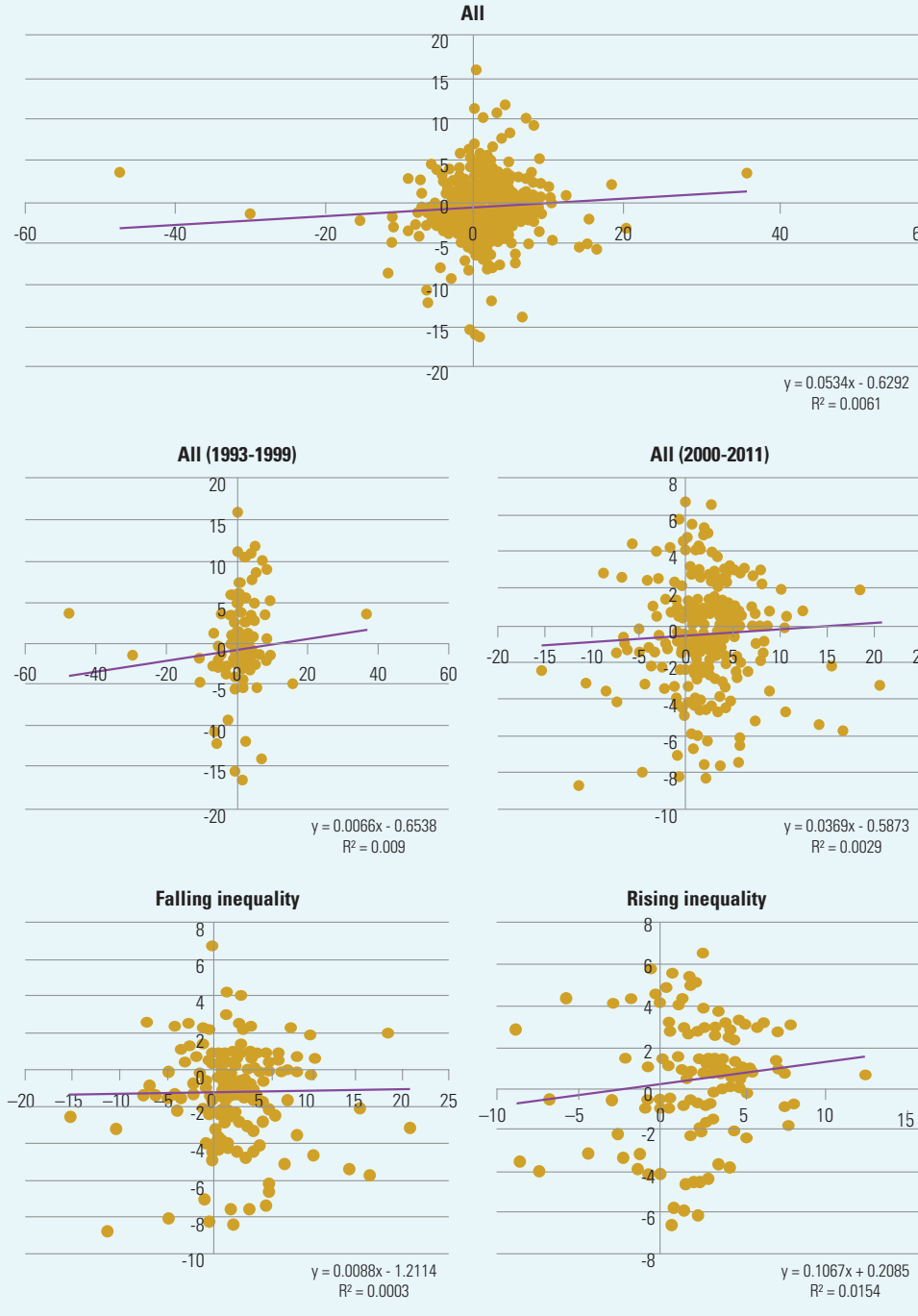
As shown in Annex 16.1, in most of the 29 sample countries plus nine countries for which there are no inequality data but for which information is available on the value added structure, this 'physiological evolution' of the production structure has not occurred. Interestingly, in nine countries dominated in 1990 by agriculture, there was a further rise in its share, reflecting either an increase in land yields (Chapter 14), rising prices for cash crops or a 'retreat to subsistence' due to the failure to modernize the economy.

The unequalising mining sector surged rapidly in another ten countries. For instance, in Equatorial Guinea in 2011, oil/mining absorbed 89.4 per cent of value added, up from 4.2 per cent in 1990. In another nine, there was an 'informal tertiarisation', with most of the value added and jobs created in subsectors exhibiting high informality, low value added per capita and high inequality. In contrast, the share of manufacturing rose in only three countries, while it increased markedly during the same years in poor Asian countries such as Bangladesh, Bhutan, Cambodia, Lao People's Democratic Republic and Myanmar.

Overall, despite a regional growth of GDP/c of 4.1 per cent, over 1990-2011, many of the 38 SSA countries analysed adopted a 'suboptimal pattern of growth' characterised by reprimarisation, deindustrialisation and informal tertiarisation.[2] In only a few cases, there was a shift towards modern agriculture, construction, manufacturing and services ancillary to industry. This suboptimal

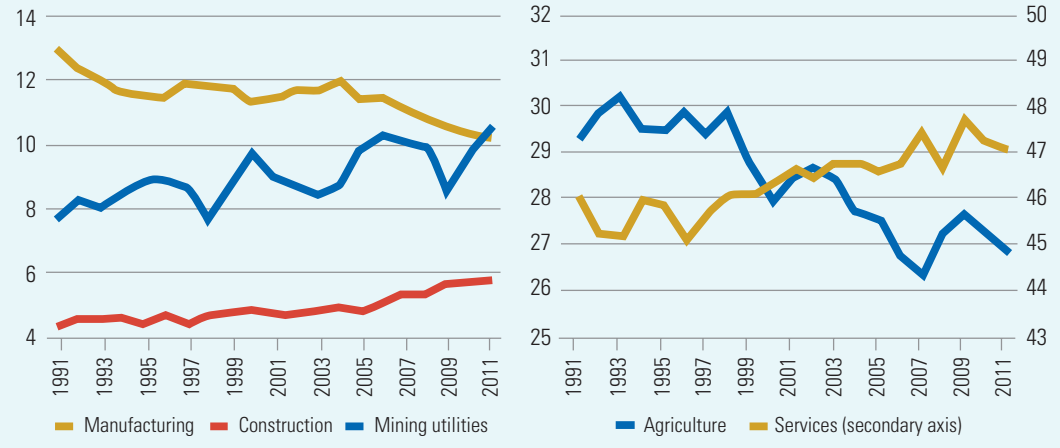
[2] A large share of wholesale and retail commerce, hotels and restaurants; as well as repairs; domestic and community services; and personal services are low skill-intensive. They are dominated by informal labour relations, the adoption of survival strategies and considerable income polarisation.

FIGURE 16.2 Relationship between the growth rate of GDP/c (horizontal axis) and the growth rate of the Gini coefficient (vertical axis), 1991/3-2011



Source: Author's calculation on official data.

FIGURE 16.3 Trends in the average value added shares of 29 sample countries for manufacturing, mining-utilities and construction (left panel); and for agriculture (right panel, left scale) and services (right scale), 1991-2011



Source: Author's elaboration on UNCTADstat.

pattern of structural transformation was due to rising prices for primary commodities, limited capital accumulation, a slow or no modernisation of agriculture and rapid trade liberalisation that displaced domestic manufacturing goods with imports. Figure 16.3 confirms that, on average, the growth pattern of 1991-2011 led to the changes in sectoral value added trends just described.

This structural transformation involved clear distributive effects. Indeed, as shown by figure 2.4 of Chapter 2, a rise in the value added share of agriculture (and, less markedly, of retail and wholesale trade) has, *ceteris paribus*, an equalising effect. Those of manufacturing, utilities, transport and construction are neutral, while mining, urban services such as FIRE, and government and personal services, are disequalising – *ceteris paribus*.

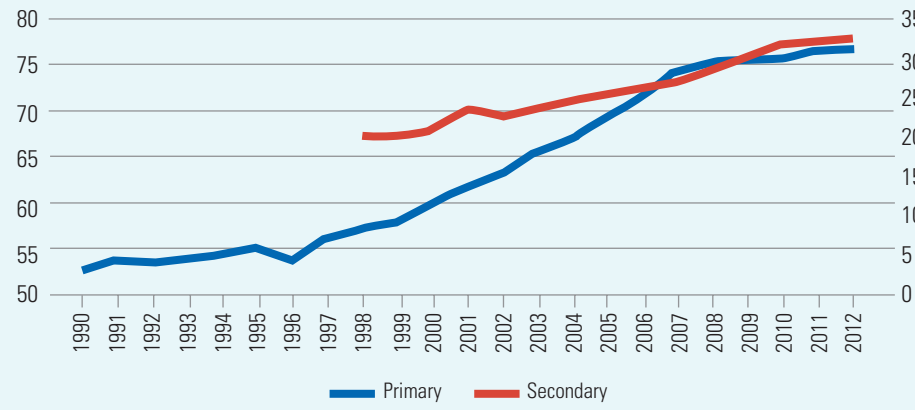
To test econometrically the distributive effects of the 'pattern of growth', the value added shares of agriculture, manufacturing and 'other services' were included in regression, expecting them to affect inequality negatively, non-significantly and positively. In turn, the impact of the expansion of the mining and oil sector is captured in regression by creating an interaction between the 'mineral rich dummy' and the terms of trade.

b) **Human capital distribution and inequality.** Within each sector, inequality depends on the household distribution of production factors. In the urban sector, the only endowment for which there is information are the Barro and Lee (2011) data on the years of education of the labour force. These data serve as a proxy for the distribution of human capital and make it possible to estimate the skill premium, i.e., the ratio of skilled to unskilled wages. In regression, the latter is proxied by the ratio of workers with secondary and tertiary education divided by that of workers with lower or no education. The higher the relative supply of skilled workers, the lower the skill premium and income inequality. Such a phenomenon is especially pronounced in the modern sector.

In rural areas, especially in agriculture, inequality depends on the distribution of land, rainfall, access to irrigation, inputs and, where modern farming techniques are widespread, human capital. For instance, in countries such as Ethiopia, where land distribution is egalitarian, rapid agricultural growth has been equalising, while this was not the case in white settlers' Southern Africa. During the last 20 years, tenancy reforms and land titling programmes improved the security of tillers in some countries, but the distribution of land generally did not improve. It is, however, impossible to include this variable in regression due to lack of data (the few data on land concentration are reported in table 2.1). Attempts were made to capture the differences in land distribution by introducing in the regression land/man ratios and regional dummies, but the results were unsatisfactory. As noted, the spread of secondary education is essential for raising land yields as, contrary to primary education that often does not ensure functional literacy and numeracy, it allows information on modern farming techniques to be absorbed.

In this regard, figure 16.4 shows that, while primary enrolment rates rose on average by 18 percentage points between 1998 and 2012, secondary enrolment rates rose by about 10 percentage points, suggesting that there is still room to improve the growth and distribution of agricultural incomes in the future. Indeed, as shown in table 16.3, the interaction of secondary enrolment rates with the share of rural population reduces inequality.[3]

FIGURE 16.4 Primary net enrolment rates (blue, left scale) and secondary enrolment rates (red, right scale)



Source: Author's elaboration on data compiled by Martorano and Cornia (2015).

c) **Population growth, dependency rates, rural-urban migration and inequality.** Contrary to other less developed regions, SSA's average population growth did not slow between 1990-1995 and 2010-2015 (figure 16.5), while it accelerated in both East and West Africa. Even assuming

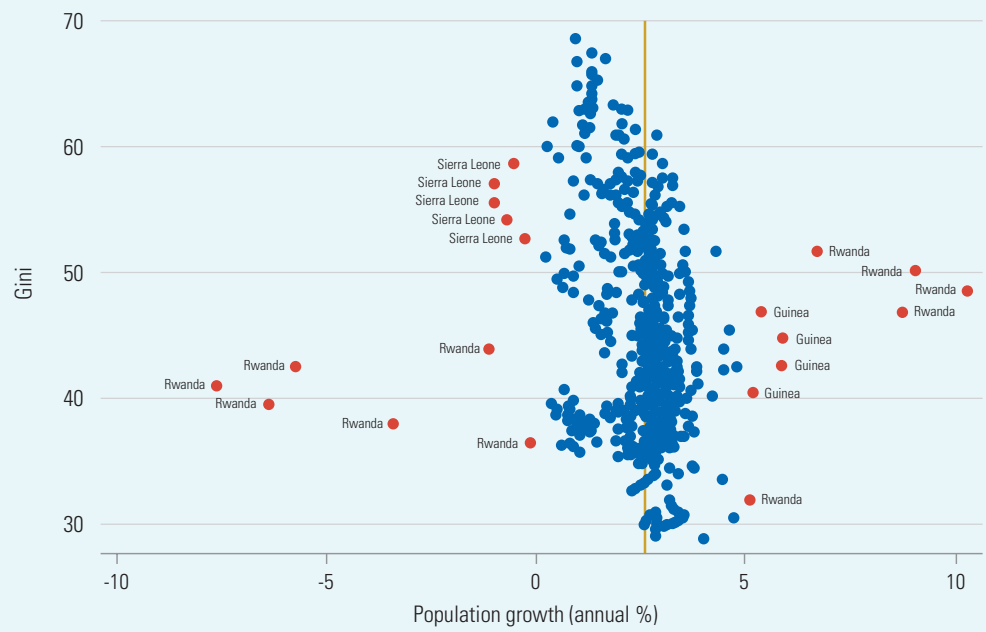
[3] The relationship between human capital and inequality would improve if the proportion of farmers with secondary education were used, instead of secondary enrolment rates. This information is available in the Barro and Lee series for the aggregate economy, but not for the urban and rural sector. In addition, as shown in Chapters 12 and 13 on Malawi and Ethiopia, other factors such as irrigation, fertilizers and rainfall affect the level and distribution of farm output.

that its growth rate will slightly decline in the future, SSA population will reach 1.2 billion by 2050 because of persistently high TFR rates. However, differences are starting to emerge. While over 1990-2015, Niger's TFR stagnated at 7.6-7.7, in Ethiopia it fell from 7.4 to 4.6 as a result of a proactive public policy. Most of the region has thus not benefitted yet from the 'demographic dividend', while inequality rose because of growing pressure on private and public resources. However, national data do not capture easily this effect in regression analysis because of the similarity of national population growth rates, in spite of different Gini coefficients (figure 16.5).

However, the unequalising effect of high population growth is evident from microdata, especially in urban areas where the dependency rates are lower and decline faster among high-income households (table 16.2), a fact that, *ceteris paribus*, raises inequality. Thus, the aggregate dependency rate was introduced in regression, expecting that it would correlate positively with inequality, while being aware, however, that this effect is not easily captured on nationwide data.

As noted in Chapter 2, inequality is generally higher in urban areas, due to the higher dispersion of market incomes in both the formal and informal sectors. While the share of 'other services' (a large part of which are urban-based) has already been introduced in regression, the first difference over time in the share of urban population was also included in regression to capture the additional effects of urbanisation. Yet, this variable correlates closely with the skill premium (Annex 16.3), thereby causing a multicollinearity problem that renders it non-significant. Chapter 9 provides a detailed analysis of the relationship between inequality and population growth and related variables.

FIGURE 16.5 Primary net enrolment rates (blue, left scale) and secondary enrolment rates (red, right scale)



Source: Author's elaboration on United Nations Population Division and IID-SSA data.

TABLE 16.2 Trends in the share of dependents (<15,>64), by area and consumption quintiles, Ethiopia

		I Quintile (Poorest)	II Quintile	III Quintile	IV Quintile	V Quintile (Richest)
Rural	2000	n.a.	n.a.	n.a.	n.a.	n.a.
	2005	57.3	56.0	53.6	49.3	45.3
	2011	55.8	53.5	53.0	51.1	46.1
Urban	2000	41.9	42.5	39.7	37.0	26.8
	2005	46.4	42.6	40.7	36.7	30.9
	2011	41.9	42.5	39.7	37.0	26.8
	% change 2000-2011	- 15.0	-9.6	-8.6	-3.7	-17.3

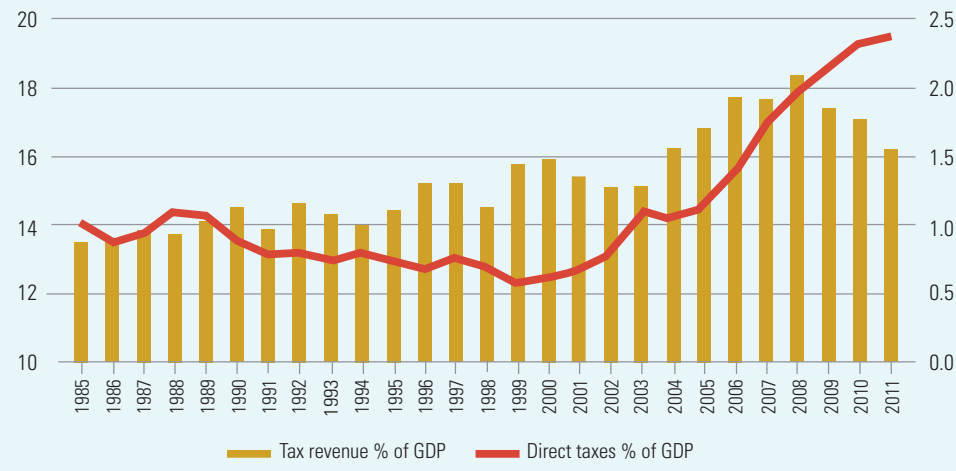
Source: Author's elaboration on Ethiopian Household Survey data.

16.2.2 Underlying causes of inequality

Inequality depends to an important extent on its underlying causes, which either influence the immediate causes of inequality or affect it directly.

d) Policy changes. Tax/GDP ratios and tax incidence can also influence the progressivity of income distribution in SSA. Until recently, taxation depended mainly on regressive trade and indirect taxes (Chapter 2, table 2.7, and Chapter 7). Yet, the tax/GDP ratio and, in several countries, direct taxation relative to the total have increased since 2003 (figure 16.6). While an increase in tax revenue/GDP may or may not reduce inequality, a rise of direct tax revenue is likely to be

FIGURE 16.6 Average regional tax/GDP ratio (vertical bars, left scale) and direct taxes/GDP ratio (right scale)

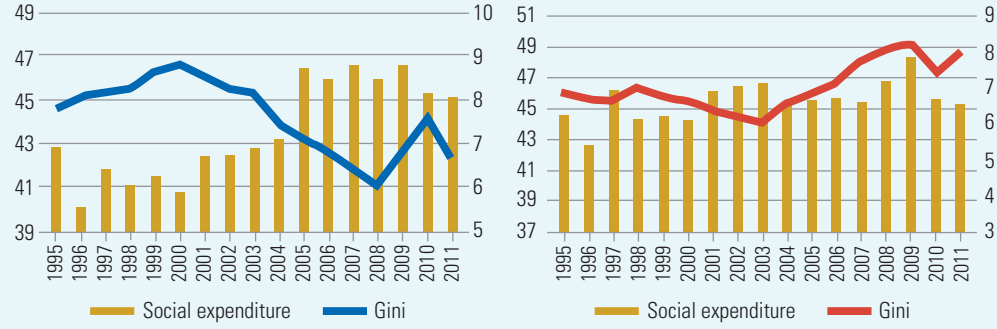


Source: Author's elaboration on data compiled by Martorano and Cornia (2015).

equalising. This variable was thus included among the regressors. The progressivity of taxation may not have improved, however, in mining economies experiencing capital flight, despite a rise in corporate tax revenue.

Similarly, an increase in public social spending as a proportion of a generally rising GDP is likely to be equalising even if the share received by the top quintiles is greater than that of the bottom ones (see Chapter 15, figure 15.12). Expenditure on health and education as a share of GDP has risen in much of the region and its targeting improved because of the emphasis placed by MDGs on pro-poor public spending. While greater availability of social services does not increase household monetary consumption, it replaces private outlays in these areas, thereby raising the consumption of other basic items. In Southern Africa and a few other countries, public expenditure on social benefits and pensions also rose perceptibly. Figure 16.7 (left panel) shows that this increase was associated with falling inequality. In contrast, where social spending stagnated (in spite of a growing fiscal space), the Gini index rose. To capture these effects, the variable 'public expenditure on health, education and transfers/GDP' was introduced in regression, expecting it to have a negative sign. A comprehensive analysis of the impact of fiscal policies (taxes, expenditures and social protection) on inequality is contained in Chapter 7.

FIGURE 16.7 Evolution of public spending on health, education and social transfers as a share of GDP in relation to the Gini coefficient in countries with falling and inverted U-shaped Gini (left panel), and rising and U-shaped Gini (right panel)



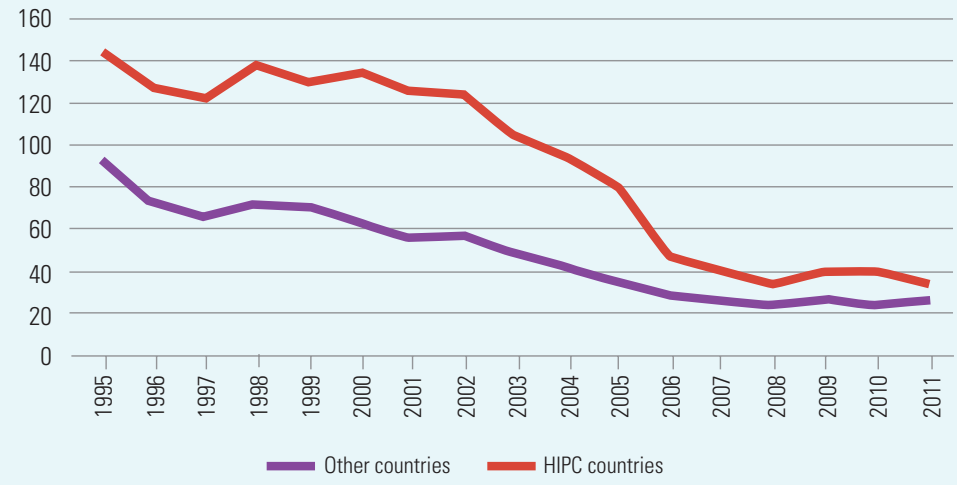
Source: Author's elaboration on data from Martorano and Cornia (2015).

Macroeconomic policies affect inequality in several ways: real interest rates affect returns on financial assets and the level of employment; inflation reduces household's purchasing power; and changes in debt policy affect the external debt/GDP ratio, balance of payments, imports and allocation of budget funds between debt servicing and essential imports and social spending. In turn, an appreciation of the real effective exchange rate (REER) shifts production factors from labour-intensive agriculture and manufacturing to non-tradables, some of which are skilled labour- and capital-intensive or are characterised by high informality and inequality. Finally, trade liberalisation shifts capital and labour to sectors with the greatest static comparative

advantage (the primary sector), but penalises infant manufacturing and the achievement of dynamic comparative advantages.

The evidence for the 29 SSA sample countries for 1985-2011 shows that the real interest rate was high (with modal values around 20-25 per cent) and unstable. Yet, since 90 per cent of the agents are excluded from formal credit and weak monetary transmission mechanisms, this variable is unlikely to affect inequality and was therefore dropped. Second, the CPI (inflation rate) recorded a general and steady decline (table 2.13 in Chapter 2 of this book), although it fell more rapidly in the CFA franc countries (where, except in bad harvest years, inflation tends to target that of the anchor currency) than in Kenya, Nigeria, Lesotho, Ghana and others that recorded inflation rates of 10-15 per cent. A low CPI is generally assumed to reduce inequality, but if the food price index (FPI) rises faster than the CPI, consumption inequality tends to increase (Chapter 15). Data scarcity does not, however, allow FPI to be introduced in regression. The CPI was included instead, expecting its coefficient to have a positive sign. Third, almost all of the SSA countries experienced a reduction in the foreign debt/GDP ratio, especially in the HIPC countries (figure 16.8), with positive effects on debt servicing, balance of payments, imports, fiscal space and consumption inequality.

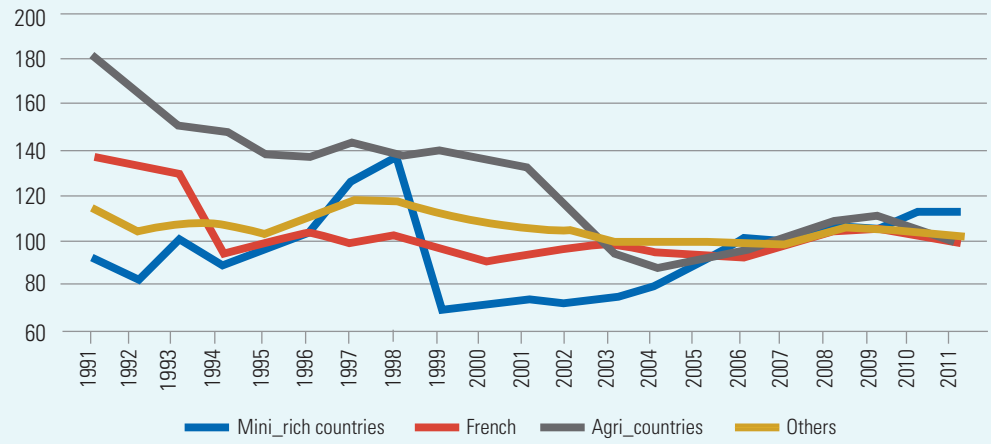
FIGURE 16.8 Trend in the external debt/GNI ratio, 1995-2011



Source: Author's elaboration on data compiled by Martorano and Cornia (2015).
Note: The HIPC countries are Burkina Faso, Cameroon, Ethiopia, Ghana, Guinea, Guinea-Bissau, The Gambia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Sierra Leone, Senegal, Tanzania, Uganda and Zambia.

In turn, the REER depreciated on average between the 1990s and 2003/04. However, it appreciated in the mining economies affected by the Dutch disease. Since 2003/04, it also appreciated in the countries that export agricultural goods and the CFA franc countries (figure 16.9).

FIGURE 16.9 Trends in the REER by country group, 1991-2011



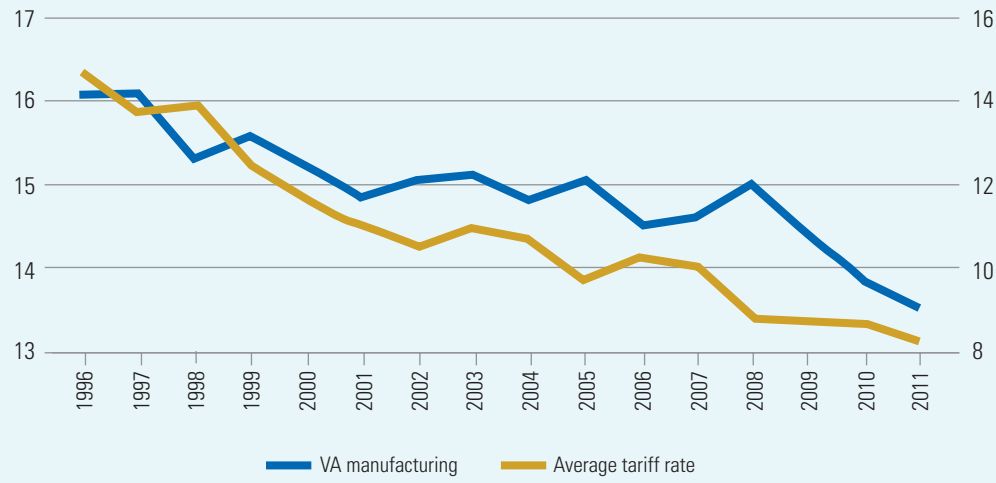
Source: Author's elaboration on data compiled by Martorano and Cornia (2015).
Notes: Countries are assigned to only one group, with a few exceptions for borderline cases. Mauritania is included in both the mineral-rich Francophone countries, while Burkina Faso, Central African Republic, Guinea and Niger are included in both the agricultural and francophone groups. REER = real effective exchange rate. Mini_rich = mineral rich countries. Agri_countries = agrarian countries.

Finally, with trade liberalisation, average tariff rates declined from about 15 to 8 per cent. However, such measures reduced the size of the labour-intensive manufacturing sector created after independence, with effects likely to be disequalising (figure 16.10) as it shifted resources from manufacturing to services. Figure 16.10 thus confirms the results of an overview of the literature (Koujianou, Goldberg and Pavcnik, 2007) that shows that trade liberalisation raises inequality for several years after its introduction. However, data on tariffs are available on average for only five to six years and not for all countries, making it impossible to include this variable in regression.

e) **Changes in the global economic environment.** The suboptimal transition in economic structures discussed in subsection (a) (pages 371-374) was driven not only by limited capital accumulation, high birth rates, and weak trade and industrial policies but also especially in some countries, by changes in global economic conditions.

As discussed in Chapter 2, SSA's regional terms of trade index and export/GDP ratio rose during the 2000s. At the same time, FDI (mostly directed to the oil and mining sector) rose from 3.0 to 5.3 per cent of GDP over 2000-2011. Overall, it is likely that terms of trade gains in oil/mineral-exporting countries and the growing FDI in the resource sector had a disequalising effect due to its high capital and skilled labour intensity. When these gains accrued to state authorities or were taxed and redistributed, their rise may have generated equalising effects. Yet, as noted, the evidence suggests a weak relationship between terms of trade and revenue-to-GDP ratio, due in part to capital flight. In contrast, the terms of trade gains of agricultural crops (table 2.9) had an equalising effect, because their cultivation is labour-intensive and smallholders produce an important share of their output.

FIGURE 16.10 Average regional tariff rate (blue line, right scale) and average value added of the manufacturing sector (yellow line, left scale)



Source: Author's elaboration on Martorano and Cornia (2015).
Note: Outliers (i.e., manufacturing value added shares >30 or < 10) were dropped.

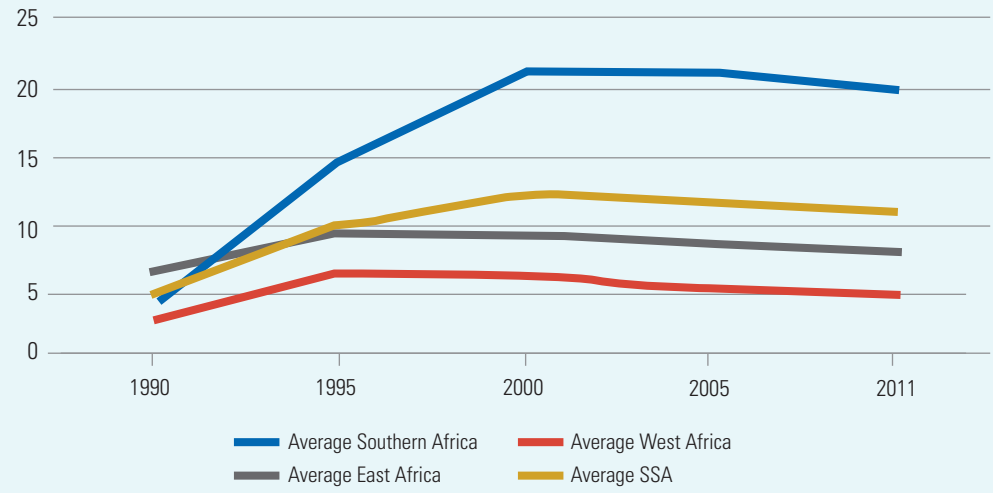
Recorded remittances grew fourfold between 1990 and 2010 (Chapter 2, figure 2.6). According to the 'hump theory of migration', remittances are unequalising because only middle-income households are able to finance the high cost of migration and, as a result, remittances accrue to better-off households (IMF, 2005). Evidence about remittances received from outside SSA confirm this hypothesis (Ratha et al., 2011). However, in Africa a large part of migration is seasonal, informal, directed to neighbouring countries and low-cost. Its impact on inequality may also be mediated by different factors, including cumulative wealth, productivity and network effects (Docquier et al., 2006). Diaspora effects may also be relevant, as in the case of the Ethiopian Renaissance Dam, the construction of which is funded, *inter alia*, by a Diaspora Fund. Due to all this, the rural poor can also migrate and remit money home. Such a variable was thus included in regression, expecting its parameter to be negative. Between 1990 and 2011, the region experienced negligible or negative portfolio inflows. However, it recorded a large drop in the foreign debt/GDP ratio as a result of the completion of the HIPC initiative. The first difference of the external debt/GDP ratio was thus introduced in regression. Finally, foreign aid to SSA declined from US$25 to US$15 billion over 1990-2001, to rebound to about US$40 billion by 2006-2007. Theory and empirical evidence are divided on the impact of aid on inequality. Some argue that it may induce self-interested recipients to engage in rent-seeking activities, while donors may allocate aid in ways contradicting their pro-poor rhetoric (Herzer and Nunnekamp, 2012). However, in examining ODA allocations since 2000, Hailu and Tsukada (2012) find that aid was distributed according to MDG-sensitive criteria. The variable net ODA received/GDP was thus introduced in regression, expecting it to have a negative sign.

f) Health, technological and political shocks. Since the early 1990s, HIV/AIDS incidence rose in all regions, if at different rates (figure 16.11). Microeconomic evidence indicates that HIV/AIDS widened the income gap between non-infected and infected households who forgo the income of their sick adults and family members who care for them, while having to bear large medical and funeral costs (Cornia and Zagonari, 2007). To capture this effect, the variable 'adult HIV/AIDS incidence rate',[4] was included in regression, expecting its sign to be positive.

In contrast, during the last decade, SSA experienced an endogenous diffusion of low-cost and highly divisible technologies such as cell phones, Internet and solar panels that might have helped integrate marginalised producers and consumers into the market. Between 2004 and 2011, the average number of people with access to mobile phones rose from 10 to 60 per cent and that of Internet users to 10 per cent. While the growth effect of such technological shock was favourable, the effect on inequality is likely concave since these new technologies may be acquired initially by the middle class. Inequality may start falling only when their use is sufficiently widespread. To test the impact of technological shocks, the number of cell phones per 100 people was included in regression, expecting its sign to be positive, given that most countries were in the initial phase of their diffusion during the sample period.

Between 1993 and 2010, the number of conflicts in the region fell from 25 in 1993 to ten in 2010 (Chapter 2, figure 2.1). Such decline affected growth and inequality favourably, as war-induced human losses, destruction of infrastructure and refugee dislocations ended, while black markets faded away, production and employment bounced back, and state and international agencies

FIGURE 16.11 HIV/AIDS incidence in the adult population, SSA and its main regions



Source: Author's compilation on official data.

[4] A precise specification of this variable would require introducing a lag equal to the number of years that the HIV virus takes to become conclamated or full-blown AIDS. This would entail, however, a major loss of degrees of freedom.

started providing basic services again. The definition of war intensity is not simple. This chapter uses the Major Episodes of Political Violence dataset (1946-2014), developed by the Center for Systemic Peace (www.systemicpeace.org/warlist/warlist.htm), which lists all major conflicts, be they inter- or intrastate, communal, ethnic or genocidal, or warfare. A war is observed when it involves at least 500 directly-related deaths over a period and at least 100 directly-related deaths per year. War intensity is coded on a scale of 1 to 10. A more detailed analysis of the relationship between conflicts and inequality in Africa is provided in Chapter 10.

g) **Democracy and governance.** Although democracy is difficult to theorise, define and measure, most analyses conclude that it started improving in the mid-1990s. If it leads to accountable institutions, democracy may trigger a decline in corruption and clientelistic policies and, thus, reduce inequality. The measure used here to proxy democracy consists of two complementary indexes (Vanhanen et al., 2014): 'political competition', which measures the electoral success of small parties aiming at moderating the monopoly of traditional parties; and 'political participation', which measures voter turnout, assuming that the higher it is, the greater the democratic control. The product of the two is the 'democracy index'. To capture changes in governance, the variable, 'quality of public administration', was also introduced in regression. These variables should be equalising, although the difficulty met in measuring democracy through aggregate indexes may reduce their correlation with inequality.

16.3 Dataset, variables description and estimation strategy

The conjectures presented in Section 16.2 about the inequality impact of the immediate and underlying causes of inequality were tested on panel data compiled by Martorano and Cornia (2015) for the 29 countries with IID-SSA Gini data for the years 1991/3–2011. A few data for 1985-1991/3 were added to the panel to increase the sample size. The panel has a theoretical dimension of about 800 cells, which, however, falls substantially due to missing data for the dependent or explanatory variables. Their list, metric and data sources are included in Annex 16.2. The dependent variable is the Gini coefficient of the distribution of household consumption expenditure per capita. The explanatory variables were classified into the following groups: (i) the growth rate of GDP per capita and the 'growth pattern' (i.e., the value added shares of agriculture, manufacturing and 'other services') that are meant to capture the 'between sectors' inequality; (ii) the distribution of factor endowments in urban and rural areas, so as to capture the impact of 'within sector' inequality. Due to lack of data on the distribution of land and capital, the only variable that could be used in regression was the ratio of workers with secondary and tertiary education over that of workers with lower or no education. To capture the impact of human capital in agriculture, the share of workers with secondary education, interacted with the share of rural population, was instead used; (iii) demographic variables such as the dependency rate and the first difference of the urbanisation rate; (iv) the economic and social policies discussed above; (v) changes in global economic conditions; (vi) exogenous shocks in the fields of technology, health and conflicts; and (vii) democracy and governance proxied by the Vanhanen et al. (2014) indexes.

The matrix of bilateral correlation coefficients of the 25 explanatory variables used in regression shows that, of the 288 bilateral correlation coefficients, only two (marked in yellow) are sizeable

(Annex 16.3) and could cause problems of multicollinearity.[5] The test for omitted variables bias (F=0.533) fails to reject the null hypothesis, thus negating the existence of such bias. Given the panel structure of Martorano and Cornia (2015) dataset, the estimation must take into account that each country is observed over several years. The model best suited for this kind of data is the Least Square Dummy Variable (LSDV) with fixed effects (also called 'one-way error component model'). The regression includes a dummy for every country and generates country-specific intercepts reflecting differences in geography, institutions and unobservables. The estimator thus takes the following form:

$$GINI_{it} = \alpha + \beta X_{it} + \eta_i + e_{it}$$

where $Gini_{it}$ is the Gini coefficient of the distribution of household consumption expenditure per capita, X_{it} a vector of 25 explanatory variables, the subscripts i and t refer to the countries and panel years, η_i is the time-invariant country's fixed effect, e_{it} is the idiosyncratic error term, and α and β are parameters. The seven groups of regressors discussed above were introduced in a stepwise mode starting with Model 1, which includes the growth rate of GDP, the value added shares of key sectors and demographic variables. Models 2, 3 and 4 gradually add the other variables discussed above.

Model 2 was also estimated using the LSDV estimator with country and year fixed effects (or 'two-way error component model') so as to check whether the relations identified with the above LSDV estimator are affected by changes in some of the years of the 1991-2011 period. However, this model generates parameter values that are practically identical to those obtained with the LSDV estimator, though their significance improves for four parameters and declines for three. This suggests that there was no impact of specific unobservable factors in given years. An F test confirms that this set of yearly dummies is not jointly significant. In addition, Model 2 was also regressed using the within-estimator, intended to remove unobserved heterogeneity across countries by regressing, over time, the first difference of Gini on the regressors' first differences. Such an estimator generates the same parameters and statistical significance obtained with the LSDV estimator, although, as expected, it reduces the R^2 from 0.934 to 0.522. In brief, the parameters in Model 2 are robust to different types of estimators.[6] Finally, Model 5 adopts the SYS-GMM estimator (using Model 2 as a reference) to tackle potential endogeneity problems by using the lagged values of the relevant explanatory variables, since it is practically impossible to identify meaningful instrumental variables for each of the determinants for which there might be circular causation with the Gini index. In addition, by introducing the lagged Gini among the regressors, Model 5 also deals with the issue of Gini persistence over time.

Missing data reduces the number of years/countries with complete data from a theoretical number of about 800 in Model 1 to 430 in Model 4. Yet, the regression results confirm most conjectures presented in Section 16.2 about the average regional impact of the immediate and underlying causes of the bifurcation of inequality trends among the African countries. Estimates are fairly consistent across Models 1 to 4, as there are few signs or changes of significance when adding new regressors.

Overall, the results of the regression models presented in table 16.3 suggest that:

[5] As noted in Section 16.2, the impact on Gini of a greater number of potential explanatory variables was also tested, even if theory provided only weak support for introducing them. The unsatisfactory results obtained suggested including only those theoretically and/or empirically significant in the bilateral correlation matrix (see Annex 16.2).

[6] For reasons of space, the results of the two-way error component and WITHIN estimators could not be included in the chapter, but are available from the author. They are also included in RBA-WP n.3/2016.

(a) while the 'rate of growth' of GDP/c is uncorrelated with consumption inequality, the 'pattern of growth' (i.e., its sectoral composition) is relevant. Indeed, a rise in the value added share of agriculture, manufacturing and 'other services', respectively, reduces inequality, does not affect it significantly, and raises it (the latter with loss of significance in Models 3 and 4);

(b) better distribution or higher level of human capital reduces inequality in both urban and rural areas;

(c) urbanisation and dependency rates are significant in microstudies but not in the macro panel due to their limited variability among the sample countries;

(d) among the underlying causes of inequality, the share of direct taxes in total revenue, social spending/GDP, CPI, the first difference of REER and external debt/GDP have the expected sign and are significant, confirming that public policy can affect inequality;

(e) the gains in terms of trade of the 2000s contributed significantly to the recent drop of inequality in part of the region, except when they were interacted with a 'mineral-rich dummy'. In this case, they become strongly disequalising. In turn, migrant remittances are equalising in all specifications, while the FDI stock/GDP (that are allocated mostly to mining) raise inequality significantly. Finally, the net ODA/GDP ratio is not significant, despite the arguments presented in Section 16.2 on ODA's recent pro-poor allocation;

(f) war intensity consistently raises inequality. Except in Model 1, HIV/AIDS incidence also raises inequality modestly but significantly, due to its cross-country variability (figure 16.11). The percentage of people with cell phones does not reduce inequality, possibly because its effects may be concave rather than linear; and

(g) political competition and participation and the quality of public administration are not statistically significant, confirming the difficulties experienced when trying to capture the effect of complex political and governance arrangements by means of synthetic indexes. Yet, as suggested by Gyimah-Brempong (2002), and as seen in other chapters of this book, the redistributive effect of democracy may be captured by evidence that democratic countries redistribute more via taxation and social transfers than non-democratic ones, as confirmed by the significance of the variable 'social spending/GDP'.

The parameters in table 16.3 reflect the average regional impact of the chosen regressors on inequality over 1985-2011. Such impact may differ according to the structural characteristics of each country. In table 16.3, the problem of structural heterogeneity is handled by introducing variables among the regressors that reflect different production structures (variables 3 to 5), the share of rural population (variable 7), the increment in urbanisation rate (variable 8) and a 'mineral-rich dummy' (variable 19). Except for variable 8, all variables reflecting cross-country heterogeneity are significant.

As noted, Model 5 addresses the issues of inequality persistence and circular causation. SYS-GMM is a suitable estimator to deal with these problems, although its effectiveness may be reduced by the limited size of the sample (241 observations). Before commenting on the results of this test, it is necessary to underscore that, of the 586 IID-SSA's Gini coefficients used for the 29 sample countries and the years 1985-2011, only 169 were observed, while the remaining 417 were interpolated linearly. By construction, therefore, the Gini data between every couple of observed points exhibit a stable linear trend (see Annex 1 in Cornia and Martorano, 2015). Thus, the high number of linearly interpolated data largely explains the high value of the parameter of the lagged Gini (0.76). As a

result, the value of the other parameters declines while their significance falls, since the explanatory variables are more weakly associated with the 'residual Gini', while their standard deviations remain the same. The reduction in the value and significance of the parameters is observed for 13 of the 16 variables of Model 5. Their signs, however, remain the same.

The problems of endogeneity and reverse causation may be ruled out plausibly on theoretical grounds in the case of global economic conditions (variables 15-19), HIV/AIDS incidence and cell-phones diffusion (variables 21-22), and structure of the economy and demographic changes (variables 3 to 5 and 8-9). However, reverse causation cannot be excluded in the case of GDP/c growth (as low inequality may raise growth), and direct taxes/total revenue (as a more egalitarian distribution may promote the diffusion of social services). Similarly, high inequality affects the distribution of human capital (variables 6 and 7) because households and the state cannot finance the cost of education in the case of widespread poverty and elites' resistance to taxation, while governments may increase social spending/GDP to control an unfair distribution of market incomes. In addition, if inequality rises beyond an alarm threshold, social tensions may evolve into open conflicts. To deal with these potential endogeneity problems, the SYS-GMM estimator instruments are used for the endogenous variables mentioned above by using the moment conditions of the lagged difference instruments for the differenced equations, as well as for the level equations. In this way, SYS-GMM generates estimates of the parameters that take into account the circularity of the relation between Gini and the potentially endogenous variables. The statistical tests of SYS-GMM confirm the validity of the analysis. The AR2 test negates the presence of autocorrelation of order 2. In addition, the Sargan test of overidentification restrictions concerning the validity of the instruments accepts the null hypothesis; thus, the instruments pass the test. The results of Model 5 show that, in relation to Model 2, there are three changes in the direction of causality: the GDP/c growth rate becomes inequality-reducing, while the value added share of 'other services' and the share of direct taxes in total revenue (equalising in Model 2) become non-significant.

Finally, table 16.4 presents a robustness check of the parameters estimated over 1985-2011 using as reference, Model 2 in table 16.3. The first check restricts the estimation period to 1995-2011, the second and third to countries with rising or falling inequality, and the fourth, to non-interpolated Gini only. Before assessing these results, it is essential to point out that the number of observations of each subsample is very small. In Models 3 and 5, it falls to 92 and 81, while the number of parameters to be estimated is 46 (17 plus 29 country intercepts). Given this, it is normal to expect weak results. Overall, out of the 68 (17 x 4) parameters of Models 2-4 in table 16.4, five became significant and had the right sign in relation to the reference Model, while 14 became non-significant, and two (identified by a ^) are significant at the 15 per cent level of probability. While Model 2 confirms closely the findings of Model 1 in table 16.3, and while Model 5 generates almost-acceptable results despite its few observations, Models 3 and 4 are problematic, as five and seven variables, respectively, out of 16 change significance. The variables that exhibit the most unstable results are the value added share of 'other services', ΔREER, FDI and war intensity. In contrast, the value added share of agriculture, GDP growth, the distribution of human capital, secondary education in rural areas, the terms of trade (alone and interacted with mineral rich dummy) and net ODA largely confirm the findings of the reference model.

Overall, given the small size of the subsamples and decline in variance due to the similar behaviour of the countries of a same subsample, the above robustness check can be considered partly satisfactory.

It suggests that, at least for the four variables mentioned above, the results of table 16.4 are also valid on small subsamples, while 11 out of 17 are also 'broadly significant' on the subsamples.

16.4. Conclusions, policy recommendations and scope for further research

The analysis presented in this chapter constitutes one of the first attempts at exploring the determinants of inequality in SSA over the last two decades by means of a macroeconometric panel analysis. While caution is in order due to the data limitations, errors affecting the dependent and explanatory variables and still-pending theoretical issues concerning the direction of causality, the evidence presented in this chapter offers a first plausible narrative of what happened to inequality in SSA during the 1990s and 2000s. The results confirm most of the hypotheses set out in various chapters of this book on the effects of changes observed during the last 20 years. They are also broadly consistent with the microeconomic decompositions carried out in Chapters 12 and 13.

Although inequality declined in part of the region, the level in several SSA countries remains high. A better understanding of SSA's inequality dynamics is essential in terms of policy because, among other things, it reduces the region's poverty alleviation elasticity of growth well below that of other continents. The achievement of the SDGs over the next 15 years must therefore focus on reducing inequality, especially in countries where it rose or remained high for historical or institutional reasons.

The results presented in Sections 16.2 and 16.3 suggest that raising the growth rate does not guarantee lower inequality. The SYS-GMM estimates of Model 5, table 16.3 offer a slight nuance to this statement by suggesting the existence of a virtuous circle by which lower inequality promotes growth that, in turn, reduces inequality further. However, this is not true in countries with high initial inequality. There is clear evidence, instead, that the growth pattern affects inequality. Increases in land yields accelerate growth, while reducing inequality or maintaining it at acceptable levels (World Bank, 2014). This is the main message of the Ranis-Fei (1961) model, which emphasises that early investments in agriculture are essential for industrialisation and the development of complementary modern services.[7] Such an approach requires supportive agricultural policies, creation of infrastructure, equitable land distribution, diffusion of secondary education in rural areas and a competitive exchange rate (as confirmed by the significance of variables 7 and 12 in table 16.3). By raising rural incomes, this strategy also prevents large distress migration to the disequalising urban informal sector or a return to subsistence agriculture whenever efforts at modernisation fail, as shown by panel (a) of Annex 16.1.

The growth of the mining/oil sector observed in 10 countries in Annex 16.1, panel (b) has been disequalising for the reasons discussed in Chapter 2 and as confirmed in tables 16.3 and 16.4 by the positive sign of the terms of trade interacted for the mineral rich dummy. Clearly, an increase in mining wealth is welcome news, but it needs to be managed carefully to minimize capital flight, avoid the natural resource curse, create redistributive institutions (as, for instance, in low-income mining economies such as Bolivia and Peru) and diversify the economy over the medium term. In contrast, a growth pattern emphasising manufacturing keeps inequality low, while modernizing the economy by generating economies of scale, learning by doing, and positive spillovers. Yet, as shown in Annex 16.1 panel (c), over the last 20 years only three countries raised their value added share of manufacturing.

[7] Ercolani and Zheng Wei (2012) argue that the success of China's growth since 1978 depended on a policy sequence similar to that postulated by the Ranis-Fei model.

TABLE 16.3 Regression results, dependent variable Gini of household consumption/capita, 1985-2011

	Sign expec. ex ante	1 LSDV	2 LSDV	3 LSDV	4 LSDV	5 SYS-GMM
1. Gini (t-1)	+					0.76***
(i) Growth rate and pattern						
2. GDP growth rate	- , ns	- 0.07**	0.01	-0.09	-0.09	-0.07**
3. % VA agriculture	-	- 0.15*	-0.30***	-0.14	-0.31**	-0.14*
4. % VA manufacturing	Ns	- 0.00	-0.15	-0.10	0.04	-0.22*
5. % VA 'other services'	+	0.33***	0.18*	0.13	0.00	-0.06
(ii) Distribution of prod. factors						
6. % of workers with secondary-tertiary educ./workers with lower education	+	0.61***	1.05***	1.25***	1.38**	0.47**
7. % of workers with secondary education * % of rural population	-	- 0.02***	- 0.02***	- 0.02***	- 0.02***	- 0.01
(iii) Demographic variables						
8. Δ % urban population	+ , ns	3.87***	n.a.	-1.37	2.39	n.a.
9. Age-dependency ratio	+ , ns	- 0.36***	n.a.	0.02	0.13	n.a.
(iv) Economic/social policies						
10. Direct taxes /total taxes	-		- 0.05***	-0.10***	-0.09***	0.02
11. Social spending/GDP			-0.16^	-0.24*	-0.46**	-0.19*
12. Δ REER	+		0.03*	0.04**	0.05**	0.03*
13. Δ external debt /GDP	+		0.03**	0.03**	0.03**	0.01
(v) Changes in global conditions						
15. Terms of trade (ToT)	+,-		-0.02	-0.05***	-0.09***	0.00
16. ToT *mineral-rich dummy			0.12***	0.13***	0.17***	0.06
17. Remittances (% of GDP)	ns, -		-0.15***	-0.20***	-0.67***	-0.07***
18. FDI (% GDP)	+		0.13***	0.04	-0.25**	0.01
19. Net ODA/GDP	-		0.09	-0.00	0.10	0.13***
(vi) Exogenous shocks						
20. War intensity	+		0.58^	0.74*	1.15**	0.16
21. Δ HIV/AIDS incidence	+		n.a.	0.68*	-0.51	n.a.
22. % of people with cell phones	+		n.a.	0.01	0.03	n.a.
(vii) Democracy-governance						
23. Political inequality	+				0.01	
24. Political participation	-				0.03	
25. Quality public admin.	-				-6.58	
Constant		117.93***	58.24***	68.61***	62.89***	15.65
Country dummies		Yes	Yes	Yes	Yes	Yes
Observations		430	245	218	169	241
R-squared		0.797	0.934	0.943	0.946	
Sargan test						0.233

Source: Author's elaboration on Annex 16.1 data.
Note: *** p<0.01, ** p<0.05, * p<0.1, ^ p<0.15, ns means not significantly different from zero and VA stands for value added. Sig. means significance.

TABLE 16.4 Robustness check of the results of Model 2

Variables	Reference model (n.2 in table 16.3) 1985-2011	Baseline model 1995-2011	Falling inequality countries 1985-2011	Rising inequality countries 1985-2011	Observed Gini only 1985-2011
	Model 1	Model 2	Model 3	Model 4	Model 5
Estimator	LSDV	LSDV	LSDV	LSDV	LSDV
Differences in sign and significance vis-à-vis baseline model (16 variables)	n.a.	1 change in Sig.	7 changes in Sig.	7 changes in Sig.	5 changes in Sig.
(i) Growth rate and pattern					
2. GDP growth rate	0.01	0.06	0.12***	-0.11	-0.07
3. % VA agriculture	-0.30***	-0.23**	-0.19**	-0.71***	-0.40**
4. % VA manufacturing	-0.15	-0.14	-0.02	-0.88***	-0.05
5. % VA 'other services'	0.18*	0.22*	0.16	-0.04	0.47
(ii) Distribution of factors endowment					
6. % of workers with secondary or tertiary education/workers with lower education	-0.02***	-0.02***	-0.01*	-0.02***	-0.02***
7. % of workers with secondary education * % of rural population	1.05***	1.72***	-0.49	1.19***	1.02**
(iv) Economic/social policies					
10. Direct taxes (% of total taxes)	-0.05***	-0.05***	-3.00*	-2.52**	0.01
11. Social spending/GDP	-0.16^	-0.27*	-0.22^	-0.41*	-0.14
12. Δ REER	0.03*	0.05**	-0.00	0.02	-0.00
13. Δ external debt /GDP	0.03**	0.03*	0.01	0.07**	0.01
(v) Changes in global conditions					
15. Terms of trade (ToT)	-0.02	-0.02	-0.05***	0.02	-0.01
16. ToT *mineral-rich dummy	0.12***	0.12***	n.a.	0.23^	0.15***
17. Remittances (% of GDP)	-0.15***	-0.25***	-0.15***	-0.17	-0.15
18. FDI/GDP	0.13***	0.03	0.17***	0.13	0.29***
19. Net ODA received/GDP	0.09	0.11	0.04	0.16	0.17
(vi) Exogenous shocks					
20. War intensity	0.58^	0.45	1.57***	1.02*	-0.33
Constant	58.24***	80.08***	61.93***	63.08***	82.37***
Country dummies	Yes	Yes	Yes	Yes	Yes
Observations	245	197	92	109	81
R-squared	0.934	0.941	0.971	0.950	0.928

Source: Author's elaboration on data compiled by Martorano and Cornia (2015).
Note: As in table 16.3 and Sig. means significance.

Overall, the evidence suggests that over 1990-2011, several countries experienced a suboptimal structural transformation as resources were shifted towards capital and skills-intensive sectors and the urban informal sector, while in some cases, there was a retreat to subsistence agriculture. Consequently, this led to reprimarisation, deindustrialisation, informal tertiarisation and rising inequality in half of the region.

As regards within-sector inequality, the discussion in Chapter 2 and the results of tables 16.3 show that in both urban and rural areas, inequality depends on the distribution of production assets. Yet, there is little empirical information in this regard. Given the still-high share of rural population in most of SSA, greater efforts at documenting the evolution of land distribution cannot be postponed. In turn, tables 16.3 and 16.4 show that an increase in secondary and tertiary graduates favourably affects inequality because it reduces the skill premium in urban areas and facilitates the spread of modern technologies in rural areas. Yet, the evidence for the 1990s and 2000s indicates an insufficient aggregate rise in secondary education, while in Chapter 2, Ferreira (2014) shows that its increase was skewed in favour of the rich in three-quarters of the African countries. The need to invest in secondary education is especially acute when noting that SSA also recorded a technological revolution that raises the demand for skilled workers.

Population growth and its implications for dependency ratio, labour supply and inequality need to receive greater attention. Except for Southern Africa, the population growth rate remained unchanged at 2.5-2.7 per cent and accelerated in parts of the continent. Theoretically, population growth raises inequality because of rising pressure on land, distress urbanisation, high dependency rates among the poor, falling wage rates and a smaller scope for equalization through social spending. To benefit from the demographic dividend, policymakers must intensify efforts to lower TFR to moderate the pressures on inequality and environmental sustainability (World Bank, 2015). Virtuous population policies[8] have been implemented in Ethiopia and Rwanda, but now need to be mainstreamed. Due to the limited variability of this variable in the macro panel used in this chapter, it was impossible to capture the disequalising effect of high population growth on aggregate data, but such effect is evident in the analyses presented in Chapter 13.

An encouraging finding of the econometric analysis is that 'policy matters'. Indeed, economic and social policies were found to reduce inequality. The trend towards rising taxation and its greater progressiveness affected inequality favourably, if modestly. If additional fiscal space is created (i.e., if overall taxation and foreign aid rise and if export windfalls are redistributed), this could lead to large inequality gains in coming years (see variables 10 and 11 in tables 16.3 and 16.4). The main task now is to create redistributive institutions with broad coverage.

Appropriate macroeconomic policies can also help to reduce inequality. Real interest rates are uncorrelated with inequality because of the weakness of monetary policy transmission mechanisms in informal and credit-rationed economies. The main issues here are the expansion of credit and banking coverage. In contrast, a stable and competitive real effective exchange rate (REER) is equalising because it shifts production towards the labour-intensive tradable sector, while providing it protection from competing imports. The recent shift towards its real appreciation thus needs to be halted. Reducing inflation was found to be equalising. Data availability permitting, the FPI should also be included in regression in years of sharp food prices rises.

[8] This refers to policies aiming at reducing the fertility rate.

Lack of data on import tariffs prevented conducting a formal test of the impact of trade liberalisation on inequality, but the evidence (figure 16.12) and related literature confirm that it contributed to the decline of labour-intensive manufacturing. Reversing the deindustrialisation experienced by SSA countries (Annex 16.1) is a key policy challenge for the development of Africa. As in Latin America (Ocampo, 2012), trade liberalisation has led to a reprimarisation of exports and output and persistent vulnerability to long-term changes in terms of trade. This pattern of integration in the world economy is unlikely to promote industrialisation and reduce inequality.

Changes in external conditions had a mixed effect on inequality. Contrary to the predictions of mainstream theory, remittances appear to have been equalising (due to their specific nature in the African context), as were the gains in terms of trade. In contrast, FDI/GDP and the terms of trade of mineral-rich countries generated, unsurprisingly, a disequalising partial equilibrium effect. Net ODA/GDP was statistically non-significant, although the cancellation of public debt in HIPC-eligible countries entailed an average drop of three Gini points.

Finally, the shocks that affected the region during the last 20 years generated contrasting effects. The modest fall in HIV/AIDS reduced inequality marginally in some models but not in others, but this may be due to the adoption of an inadequate lag structure in the specifications chosen. Given the still-high prevalence of HIV/AIDS (as well as malaria and tuberculosis), inequality can be reduced appreciably in the years ahead by expanding the fight against these diseases that affect impoverished households most. In turn, the observed decline in war intensity has been equalising, although its impact and significance varies according to the specification chosen. Finally, the regression results consistently show that diffusion of cell phones is not yet statistically significant. The distributive effect of democratisation and improvements in the quality of public administration remain elusive and need to be further explored, although they likely affected inequality indirectly through a rise in social expenditure due to the new voice of previously excluded groups.

These results can be improved in three main ways. First, additional efforts are required in data collection, standardization and tabulation. As noted, this analysis is based on some 200 well-spaced and checked Gini data and 417 reasonably interpolated ones. Data are lacking for some 20 countries (including large ones, such as the Democratic Republic of the Congo and Zimbabwe). While the number and quality of surveys have improved since the 2000s, the region still suffers from a large information gap relative to Latin America and Asia. If poverty and inequality objectives are to be achieved and if policy design must increasingly become evidence-based, then national statistical offices and international agencies must boost their efforts massively in this area.

Data on gender, ethnic and asset inequality are scarce, which biases the causal analyses and policy design, leaving policymakers in the dark or with too much discretionary power. Additional data collection efforts are also needed for those explanatory variables (FPI, tariff rates, social transfers, remittances and so on) that could not be included in regressions since only a few observations were available. Even for those introduced in regression, existing data gaps reduced the precision of the estimates. Ad hoc sectoral studies are needed for some of the most data-intensive topics, as in the case of the service sector, rural non-agricultural activities and the relationship between education, supply of skilled workers and skill premium. Finally, the quality and pertinence of variables measuring the degree of democracy, as well as the political orientation of the ruling regimes, must be improved to gain a better understanding of the politics of policymaking.

A second area in which research can be improved is the empirical strategy used to estimate the causal relations discussed above. Although various econometric estimators were used and a large number of tests carried out, all explanatory variables were specified only in linear form. Similarly, it might be useful to introduce a greater number of interaction variables. A third area for refinements concerns the modelling approach chosen. The multivariate reduced form regression approach followed in this chapter can be integrated with microbased case studies (as in Chapters 12 and 13) and, where feasible, Social Accounting Matrix- (SAM) based models.

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ANNEX 16.1 Change of value added (VA) shares by sector between 1990 and 2011

	Agriculture		Manufacturing		Mining + Util.		Construction		Services		Gini (average for the period)	Mean GDP growth rate 1990-2011
	VA share 1990	VA share 2011	VA share 1990	VA share 2011	VA share 1990	VA share 2011	VA share 1990	VA share 2011	VA share 1990	VA share 2011		
a) Agricultural economies that experienced a further rise of the agricultural VA share												
Burkina Faso	28.7	34.9	14.3	7.8	1.8	14.3	4.9	4.1	50.2	38.8	44.0	5.3
Central African Rep.	47.5	54.8	11.3	6.5	4.7	2.8	3.7	4.4	32.7	31.4	52.0	2.7
The Gambia	17.8	22.7	8.2	5.8	0.5	4.5	5.0	4.6	68.4	62.3	52.1	3.2
Guinea	19.5	24.6	3.0	6.2	21.6	20.2	8.7	6.8	47.1	42.2	40.3	3.3
Sierra Leone	48.1	56.1	3.5	2.3	3.2	4.5	2.3	1.3	42.8	35.8	47.3	2.4
Liberia	53.4	70.0	11.2	5.7	2.0	3.0	3.3	2.6	30.0	18.6	…	3.1
Ethiopia	41.1	45.2	11.1	3.8	1.7	2.6	3.6	4.1	42.5	44.2	30.1	6.0
Niger	34.0	41.4	6.4	5.1	8.4	9.5	2.5	2.7	48.5	41.1	44.8	3.0
Togo	37.9	46.6	10.5	8.3	11.3	6.7	3.4	3.4	36.9	34.9	…	2.4
Average of 9	**36.4**	**44.0**	**8.8**	**5.7**	**6.1**	**7.6**	**4.2**	**3.8**	**44.3**	**38.8**	**44.4**	**3.5**
b) Mining economies (+ utilities) that experienced a further rise of the mining VA share												
Angola	18.0	9.5	5.0	6.1	33.0	49.7	2.9	7.8	41.0	26.8	49.7	6.0
Chad	35.1	18.2	11.1	6.0	1.2	47.5	2.2	1.7	50.4	26.6	…	6.0
Congo (Dem. Rep)	30.9	22.0	11.3	16.2	13.0	22.3	4.6	4.7	40.2	34.9	…	-0.3
Congo (Rep.)	12.9	3.6	8.4	3.5	29.1	72.1	3.2	3.0	46.5	17.7	…	3.0
Equat. Guinea	61.9	1.4	1.6	0.1	4.2	89.4	4.7	6.1	27.6	3.1	…	2.0
Gabon	6.9	3.8	5.6	5.8	35.5	48.9	4.1	5.8	47.9	35.8	…	24.1
Mauritania	45.7	23.6	7.7	6.4	12.2	24.9	3.1	7.1	31.1	37.9	40.0	3.8
Lesotho	18.5	8.6	9.6	12.1	2.1	14.7	7.3	6.3	62.4	58.2	59.1	3.9
Mali	47.7	39.1	8.1	6.3	2.3	10.0	3.0	5.8	38.8	38.7	41.6	4.6
Sudan	41.4	33.9	6.0	8.0	1.2	15.3	4.9	4.2	46.5	38.6	…	5.3
Average of 10	**31.9**	**16.4**	**7.4**	**7.1**	**13.4**	**39.5**	**4.0**	**5.3**	**43.2**	**31.8**	**47.6**	**5.8**
c) Economies that experienced a rise in the manufacturing VA share												
Guinea-Bissau	44.6	47.0	7.4	11.5	0.8	0.4	10.0	1.2	37.1	39.9	40.5	2.0
Madagascar	31.8	27.7	12.2	14.3	1.0	1.6	0.8	3.7	54.1	52.5	42.5	2.2
Swaziland	10.4	7.0	36.8	41.2	3.3	1.5	3.0	2.1	46.5	48.1	52.1	3.3
Average of 3	**28.9**	**27.2**	**18.8**	**22.3**	**1.7**	**1.2**	**4.6**	**2.3**	**45.9**	**46.8**	**45.0**	**2.5**
d) Economies that experienced a rise in the construction VA share												
Côte d'Ivoire	29.7	32.1	19.8	14.9	2.4	5.5	1.8	4.9	46.3	42.6	41.2	1.3
Ghana	34.5	25.3	10.6	6.8	1.9	9.7	1.9	8.9	46.3	49.1	38.1	5.4
Tanzania	30.9	28.5	11.2	9.0	2.0	5.9	4.8	8.6	50.9	48.0	36.0	5.2
Uganda	41.8	24.3	5.3	8.9	2.1	4.0	6.7	14.0	44.0	48.8	41.1	7.0
Average of 4	**34.2**	**27.6**	**11.7**	**9.9**	**2.1**	**6.3**	**3.8**	**9.1**	**46.9**	**47.1**	**39.1**	**4.7**
e) Economies that experienced a rise of the services VA share												
Botswana	4.6	2.8	5.8	6.3	42.5	27.3	8.2	6.6	38.9	57.0	57.8	4.6
Burundi	52.4	38.2	0.8	0.9	16.8	9.6	3.4	3.5	26.5	47.7	….	1.0
Malawi	42.8	32.1	18.4	11.1	4.4	2.3	6.5	2.9	27.8	51.5	46.5	4.2
Rwanda	43.1	34.1	12.1	7.0	1.3	1.6	5.2	8.8	38.3	48.3	47.8	5.3
Senegal	19.1	14.8	17.2	14.7	3.2	5.7	2.9	4.6	57.6	60.2	41.9	3.3
Zambia	17.6	19.2	30.5	8.3	15.6	6.4	3.2	22.1	32.9	44.0	50.9	3.2
Kenya	29.9	27.1	13.9	10.7	3.8	2.0	3.1	4.6	49.2	55.5	45.7	3.1
Mauritius	11.9	3.7	26.4	17.6	1.6	1.8	6.3	6.6	53.8	70.2	37.5	4.6
South Africa	4.6	2.5	23.6	12.8	13.2	12.6	3.3	3.8	55.3	68.3	61.4	2.6
Average of 9	**25.1**	**19.4**	**16.5**	**9.9**	**11.4**	**7.7**	**4.7**	**7.1**	**42.3**	**55.9**	**48.7**	**3.5**
f) Economies that experienced stability in the sectoral VA shares												
Cameroon	21.7	23.4	19.8	14.6	7.3	9.3	3.5	5.5	47.8	47.2	45.2	2.1
Mozambique	37.1	30.8	12.7	12.7	1.1	5.9	4.5	3.1	44.4	47.5	44.2	6.5
Nigeria	31.5	31.0	5.5	1.9	38.1	41.2	1.6	1.2	23.2	24.7	44.6	5.8
Average of 3	**30.1**	**28.4**	**12.7**	**9.7**	**15.5**	**18.8**	**3.2**	**3.3**	**38.5**	**39.8**	**44.7**	**4.8**
Total	**31.1**	**27.2**	**12.7**	**10.8**	**8.4**	**13.5**	**4.1**	**5.1**	**43.5**	**43.4**	**44.9**	**4.1**

Source: Author's compilation from UNCTADstat data **Note:** Util. = Utility and Equat. Guinea = Equatorial Guinea

ANNEX 16.2 Data description, measurement unit and sources

Variable	Description	Unit of Measurement	Source
Gini	Gini index	Index (0 – 100)	IID – SSA
GDP g. r.	GDP growth rate	Growth rate	World Development Indicators
% VA agric.	% VA share of agriculture, hunting, forestry, fishing	% value added share	UNCTADstat
% VA manufact.	VA of manufacturing	% value added share	UNCTADstat
% VA other services	VA of 'other services'	% value added share	UNCTADstat
% urban pop.	Population residing in urban areas	% of total population	World Development Indicators
Skill premium	Share of population with secondary and tertiary education over the share of population with primary or no education	Ratio	Barro and Lee (2011)
% rural pop.	% of the population living in rural areas	Percentage of total population	World Development Indicators
Age depend. Ratio	Age-dependency ratio	% of working-age population	World Development Indicators
CPI	Consumer Price Index	Index 2005=100	World Development Indicators
Direct taxes (% of total taxes)	Direct taxes on total revenue	Ratio	International Centre for Tax and Development (ICTD) Government Revenue Dataset
Social spending/ GDP	Spending on education, health and welfare/GDP	Percentage of GDP	SPEED database and World Development Indicators
HIV/AIDS incidence	% prevalence of HIV in the population of 15-49 years of age	% of population aged 15-49	World Development Indicators
War intensity	War intensity	Index	Center for Systemic Peace (CSP) Major Episodes of Violence, 1946-2013
% of people with cell phones	Mobile cellular subscriptions	Per 100 people	World Development Indicators
Terms of trade	Net barter terms of trade index	Index 2000=100	World Development Indicators
Remitt./GDP	Inflow of migrant remittances	Percentage of GDP	African Development Indicators
FDI/GDP)	Foreign direct investment, net inflows	Percentage of GDP	African Development Indicators
External debt/GNI	External debt stock/gross national income	Percentage of GNI Net ODA received	World Development Indicators Net ODA received/GDP
Percentage of GDP	World Development Indicators		
Political inequality	% share of votes of smaller parties	Ratio	Vanhanen (2014)
Political participation	% share of population who voted in the elections	Ratio	Vanhanen (2014)
Quality of government	Indicator of quality of government	Index	Teorell et al. (2015)

Source: Compilation of the author.

ANNEX 16.3 Matrix of bilateral correlation coefficients for the variables used in regression

	Gini	GDP g.r.	VA Agric	VA Manu	VA Serv	Δ.urb popul.	Edu2_ rural	Skill prem.	Age depen.	% Dir taxes	Soc Ex	Δ REER	CPI	War	Δhiv	Mob Pho.	Tot	Tot-min	Remit-tance	FDI	Δ.ext-debt	Aid	Polit. ineq	Polit. partic.	Qual. Admin.
Gini	1.00																								
GDP_g.r.	-0.18	1.00																							
Agric VA	-0.74	0.05	1.00																						
Manu VA	0.03	-0.29	-0.20	1.00																					
serviceVA	0.71	-0.16	-0.71	0.01	1.00																				
Δ.urbpop	0.30	-0.08	-0.43	-0.11	0.11	1.00																			
edu2_rur	0.54	-0.08	-0.57	-0.11	0.48	0.61	1.00																		
Skill premium	0.63	-0.10	-0.65	-0.07	0.53	0.66	**0.94**	1.00																	
Age dep .	-0.62	0.13	0.65	-0.21	-0.59	- 0.47	-0.68	**-0.81**	1.00																
% Dir. tax	-0.06	0.23	0.04	0.12	-0.15	-0.15	-0.23	-0.19	0.05	1.00															
Social tr/ GDP.	0.28	0.04	-0.38	-0.44	0.42	0.23	0.41	0.39	-0.25	0.12	1.00														
Δ.REER	0.03	0.02	0.02	-0.01	0.02	-0.04	-0.02	-0.04	-0.02	0.08	0.05	1.00													
CPI	0.09	0.20	-0.01	-0.01	0.07	- 0.39	-0.33	-0.27	-0.01	0.11	0.04	0.09	1.00												
War index	-0.04	-0.05	0.06	-0.02	0.07	-0.17	-0.18	-0.16	0.26	-0.07	-0.06	-0.07	0.00	1.00											
Δ.HIV	0.30	0.00	-0.41	-0.10	0.19	0.54	0.32	0.33	-0.14	0.05	0.19	0.00	-0.45	-0.17	1.00										
Cell phones	0.51	-0.03	-0.45	0.03	0.49	0.06	0.26	0.39	-0.58	-0.02	0.16	0.03	0.55	-0.15	-0.17	1.00									
Tot	-0.11	0.07	0.07	0.12	-0.21	0.06	-0.05	-0.04	0.04	0.07	-0.20	0.17	0.14	0.08	-0.20	0.10	1.00								
Tot-min	0.48	0.05	-0.34	0.19	0.36	-0.05	0.28	0.28	-0.31	-0.06	-0.17	0.07	0.14	-0.10	0.00	0.37	0.34	1.00							
Remitt.	-0.19	0.14	-0.03	-0.12	-0.04	-0.19	-0.3	-0.26	0.30	-0.06	-0.02	-0.08	0.21	0.20	-0.07	0.08	-0.01	-0.16	1.00						
FDI	0.05	0.31	-0.09	-0.21	0.00	-0.09	0.01	0.04	-0.06	0.16	0.21	-0.05	0.33	0.01	-0.28	0.23	0.13	0.23	0.01	1.00					
Δ exdebt	0.15	-0.15	-0.14	-0.02	0.09	0.17	0.12	0.17	-0.12	-0.06	0.03	-0.49	-0.09	0.04	0.10	0.12	-0.23	-0.13	0.10	-0.06	1.00				
Aid/GDP	-0.54	0.34	0.64	-0.29	-0.51	-0.53	-0.51	-0.57	0.61	0.38	-0.04	-0.02	0.16	0.01	-0.25	-0.30	0.00	-0.13	0.08	0.23	-0.25	1.00			
Political Inequal.	0.25	-0.15	-0.07	-0.21	0.24	-0.13	0.22	0.11	0.02	0.03	0.27	0.04	0.00	0.04	0.10	-0.04	-0.14	0.12	0.04	0.09	-0.06	0.13	1.00		
Political particip	0.16	0.11	-0.11	-0.12	0.19	-0.11	0.27	0.25	-0.19	-0.10	0.00	-0.10	0.07	0.04	-0.01	0.21	-0.18	0.21	-0.12	0.07	0.07	0.13	0.19	1.0 0	
Quality pub adm	0.18	0.05	-0.41	-0.15	0.28	0.32	0.48	0.39	-0.12	-0.16	0.32	-0.06	-0.45	-0.05	0.44	-0.06	-0.22	0.01	-0.15	0.03	0.07	-0.16	0.10	0.25	1.00

Note: See Annex 16.2 for the list of variables. pub adm = public administration.