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Inclusive Growth Framework

by Alexei Kireyev, Jingyang Chen

***IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

## **IMF Working Paper**

Middle East and Central Asia Department

### **Inclusive Growth Framework**

**Prepared by Alexei Kireyev and Jingyagn Chen<sup>1</sup>**

Authorized for distribution by Christopher Jarvis

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### **Abstract**

The paper suggests an operationally usable framework for the evaluation of growth inclusiveness—the inclusive growth framework (IGF). Based on the data on growth, poverty, and inequality, the framework allows for the quantitative assessment of growth inclusiveness. The assessment relies on the decomposition of the change in poverty into growth, distribution, and decile effects, which can be calculated using the Distributive Analysis Stata Package (DASP). Availability of at least two household surveys is the main precondition for the use of the IGF. The application of the IGF is illustrated with two country cases of Senegal and Djibouti.

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## I. INTRODUCTION

- 1. In recent years, several issues traditionally considered structural have acquired major macroeconomic importance.** Poverty and equality, inclusiveness and income distribution, gender and gender issues,” employment and migration, governance and corruption, natural disasters and climate change all directly affect economic performance and stability in most countries and, therefore, can be considered macroeconomically critical. After years of attempting their piecemeal treatment and evaluation, it became clear that none of these issues could be resolved individually, as they significantly affect overall economic performance and influence one another, and should be addressed holistically.
- 2. Substantial experience has been accumulated while dealing with these issues individually.** Each issue has been the focus of economic policies and advice provided by national governments and major international institutions: growth, fiscal policies, and macro-critical structural reforms have been the statutory responsibilities of the IMF; poverty, inequality, and gender have been at the forefront of World Bank activities; employment and migration have been the focus of the International Labor Organization; the UN Framework Convention on Climate Change has debated the implications of climate change; the World Trade Organization has been painstakingly negotiating the rules of international exchange for each of the aforementioned areas for years; and other international bodies have contributed valuable data and ratings on governance, corruption, disasters, and other so called “new issues.”
- 3. The purpose of the paper is to outline the key features of an inclusive growth framework (IGF).** Inclusive growth can be seen in the context of a macroeconomic framework, which would allow governments to handle the macroeconomic aspects of key macro-critical structural issues in a coherent manner. Because such structural issues affect macroeconomic performance, they all fall squarely under the IMF’s mandate to promote domestic and global economic stability. The focus of this paper is on the impact of poverty and inequality measures on growth. Potentially, other new issues can be added to the IGF.
- 4. The paper builds on a stream of research at the IMF and beyond on the inclusive growth from recent years.** The idea of inclusiveness as the common thread of all the new issues has been articulated in Loungani (2017). Important insights on growth inclusiveness are contained in Berg and Ostry (2011), and Berg, Buffie and Zanna (2016). The calculations of key effects are broadly followed by Datt and Ravallion (1992), and Ravallion and Chen (2003) with some additional inputs from Kraay (2004), all of which are from the World Bank. A wider context for inclusive growth is provided by Acemoglu and Robinson (2012), and Rodrik (2014) in academia. Finally, the Distributive Analysis Stata Package used in this paper was developed by Araar and Duclos (2013), statisticians, and computer programmers. The paper integrates the theory initially developed by Datt and Ravallion and the

standardized tool that is now available in Stata into a tool usable for Fund policy analysis and advice.

5. **The paper contributes to the existing literature on inclusive growth in three ways.** First, it suggests the concept of the inclusive growth framework, outlines its key elements, and quantifies key effects, which would allow policy makers to draw preliminary conclusions on the degree of growth inclusiveness in their respective countries. Second, it proposes economic interpretation in the context of inclusive growth for several relatively standard statistical outputs and their interconnections. Third, it provides a tool that will help policymakers identify the targeted measures needed to improve growth inclusiveness in individual countries.

6. **The paper focuses on the IGF as a diagnostic tool and offers only a summary view of the policies needed to improve growth inclusiveness.** Such policies should be country-specific and would be largely driven by the diagnostics of the underlying reasons for low growth inclusiveness in each specific case. Although the GIF is illustrated with two country cases - Senegal and Djibouti - it does not discuss the policies that gave rise to specific outcomes. To get to the heart of the question of how growth can be made more poverty and inequality reducing and by which policies substantial country-specific research is needed. Some elements of such analysis on Senegal is included in Kireyev (2013) and on Djibouti in Kireyev (2017).

7. **The rest of the paper is structured as follows.** Part II outlines the IGF, and the methods for calculating two key effects—the growth and distribution effect in poverty reduction, and the decile growth effect in inequality change. It also presents growth incidence curves as handy visual and analytical tools. Part III contains illustrative applications of the IGF for two country cases. Part IV concludes with recommendations on how inclusiveness of growth can be improved by public policies.

## II. INCLUSIVE GROWTH FRAMEWORK

### A. Diagnostics Roadmap

8. **The inclusive growth policy framework encompasses policy issues that may otherwise seem dispersed.** It highlights the interconnections and complementarities between several policy areas that need to be included in a strategy for fostering higher and more inclusive growth. While there is no a universally accepted definition, the narrow definition of inclusive growth usually only considers its distributional aspect, in which growth can be considered inclusive if it helps improve equality. Inclusive growth is a broad sharing of the benefits of, and the opportunities for, economic growth (IMF, 2017). However, in a broad definition used in this paper, growth is considered inclusive if it is high, sustained, and extensive across sectors in per capita terms. At the same time, it also (i) reduces poverty

(*includes* the poor in the group with socially acceptable levels of income), (ii) reduces inequality (*includes* the poor in prosperity sharing), (iii) creates jobs (*includes* people in the productive part of society), (iv) reduces the gender gap (*includes* both women and men in the economy), (v) improves governance (*includes* everyone in the wealth distribution, not just a few at the top), and (vi) responds to climate change (*includes* future generations in prosperity sharing). As well seen, a common thread through these inputs is that they seek to promote inclusion (Loungani, 2017; Loungani and Ostry 2017).

9. **The paper focuses only on two of the six dimensions of inclusive growth listed above—the interaction between growth and poverty, and growth and inequality.** Other dimensions of inclusive growth require specific modelling techniques, which already exist and with some modifications could be added later. Quantification of the interaction between growth and poverty, and growth and inequality is at the core of the proposed inclusive growth framework (IGF) that would allow for the quantification of growth inclusiveness for the purposes of policymaking (Figure 1). The needed input consists of real per capita growth, and a set of static indicators related to poverty (the poverty rate and poverty gap) and inequality (the Gini coefficient, mean log deviation, and Lorenz curve) that are readily available for most countries. On this basis, dynamic indicators—changes in poverty and consumption or expenditure—can be easily calculated for each of the static indicators. Based on those, two types of effects can be estimated: the growth and distribution effects in the poverty change measure, and the decile growth effect in the inequality change measure. Quantification of these effects is sufficient for a broad assessment of growth inclusiveness and policy recommendations.

10. **Several statistical metrics allow for the evaluation of different aspects of inclusiveness in this narrow approach.** The squared poverty gap<sup>2</sup> assesses inequality as it captures differences in the severity of poverty among the poor. The Watts index<sup>3</sup> is a distribution-sensitive poverty measure because it reflects the fact that an income increase in a poor household reduces poverty more than a comparable increase in a rich household. The Gini coefficient shows a deviation of income per decile from the perfect equality line. The mean log deviation (MLD) index<sup>4</sup> is more sensitive to changes at the lower end of the income distribution. The decile ratio is the average income of the richest 10 percent of the population divided by the average income of the poorest 10 percent. Finally, in dynamic terms, the income increase of the bottom deciles can be compared to the average income increase, or

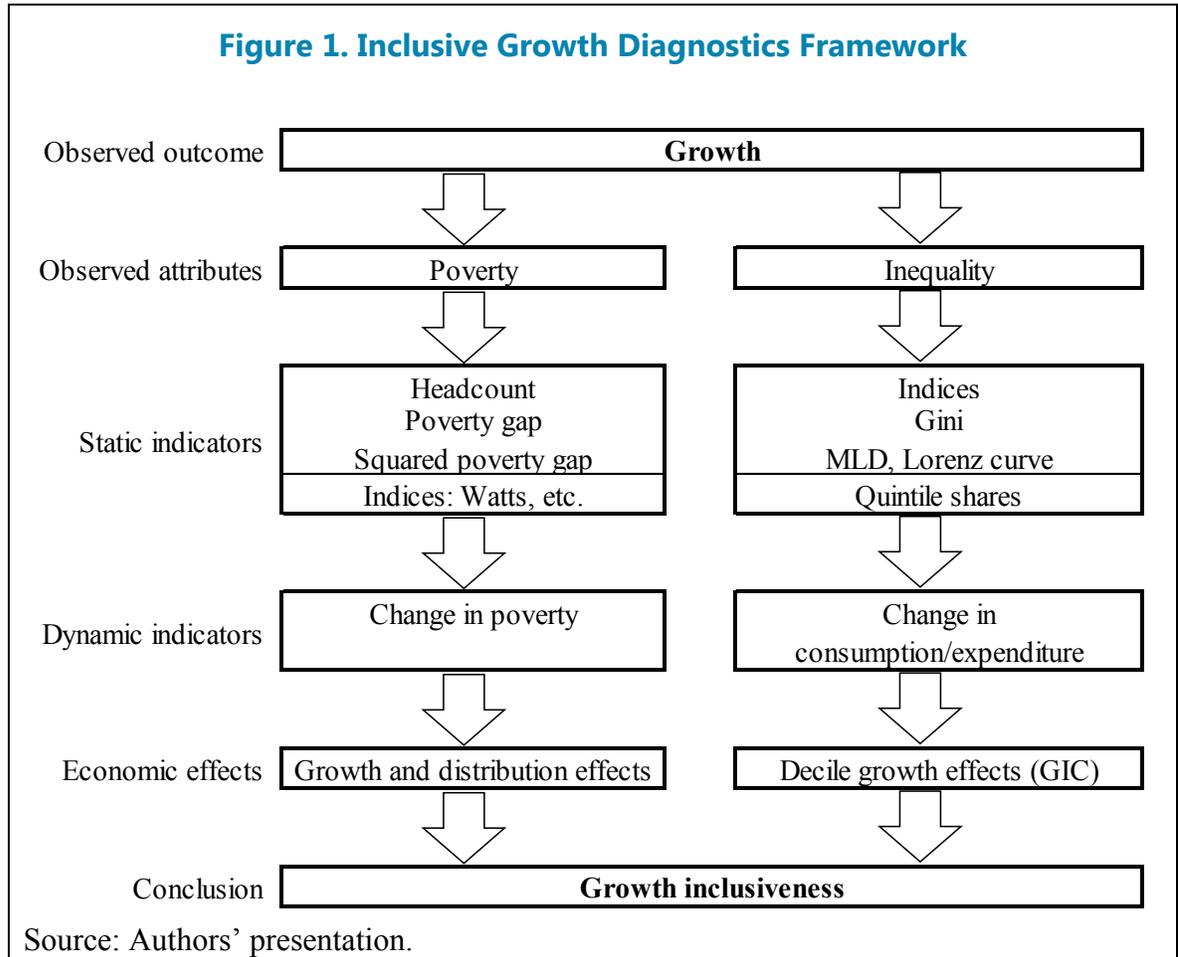
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<sup>2</sup> The squared poverty gap index averages the squares of the poverty gaps relative to the poverty line. It considers not only the distance separating the poor from the poverty line (the poverty gap), but also the inequality among the poor because it places a higher weight on households further away from the poverty line.

<sup>3</sup> The Watts index is defined as a logarithm of the quotient of the poverty line and a geometric mean of an income standard applied to the censored distribution.

<sup>4</sup> An index of inequality is given by the mean across the population of the log of the overall mean divided by individual income.

income increase, in the highest deciles of the population. If the income of the bottom decile in the distribution tends to rise proportionately or faster than the average income, growth would be considered inclusive. Although the squared poverty gap and the Watts index take into account the distributional characteristics of growth indirectly, all other methods measure equality directly.



11. **Data requirements for the IGF are relatively demanding. At least two household surveys are needed, which should cover the consumption or expenditure of the population.**<sup>5</sup> These surveys should be based on a comparable methodology and use comparable data, including household and socio-demographic variables (i.e., head of household, education, marital status, employment, and residence). Even when comparable household surveys are available, numerous data challenges remain. For example, the data on income and consumption in the informal sector may not be available, there may be outliers on both tails of the distribution (rich and poor), the definitions of variables and the coverage

<sup>5</sup> Some household surveys can be found in the World Bank micro database (<http://microdata.worldbank.org/index.php/home>).

of rural and urban areas may change. Or, finally, national data, which is calculated in national currency and relative to the national poverty line, may be substantially different from the poverty data published by the World Bank and other international institutions, as it is calculated in US dollars at PPP exchange rates and relative to an international poverty line. Therefore, in the IGF, for the purposes of policy advice to national authorities, national data should be used. World Bank data is appropriate for cross-country studies, but key poverty and inequality indicators, which are recalculated based on international methodology, most likely will not be recognized by national authorities, and, therefore, cannot be used for country specific policy advice. Another constraint is that household surveys results usually only contain household income or consumption data in that year. The fact that only two sample periods are used in the analysis may raise concern whether these two periods are representative for the period. Even if there are data on household consumption distribution for 2000 and 2010, for instance, the distribution could be very different from 1991, 2005, and 2011, and thus there is a risk that the results of the IGF analysis cannot be readily generalized.

12. **The paper focuses on inequality in consumption or expenditure as the main criterion of inclusiveness.** This approach is driven by data availability and requires qualification. The poor are likely to spend any increase in income on consumption, while for the rich a rise in income will have a minimal effect on consumption, because it is already very high. Therefore, there may be a decrease in inequality of consumption, while income inequality may in fact be increasing.

### B. Change in Poverty: Growth and Distribution Effects

13. **As a first step toward the growth inclusiveness assessment, the change in poverty rates can be decomposed into growth and distributional effects.** Following Datt and Ravallion (1992), the poverty rate  $P_t$  can be expressed as:

$$P_t = f(z, \mu, L_t) \quad (1.1)$$

where  $z$  is the poverty line,  $\mu$  is the mean income and  $L_t$  is the Lorenz curve at time  $t$ , representing relative income inequalities. From (1.1) it is seen that the poverty rate may change either because of the change in the mean income or relative inequality. Intuitively, a generalized salary increase raises the mean income and improves the poverty rate relative to the fixed poverty line for any fixed distribution; a transfer from the richest household to the poorest household reduces poverty by improving distribution with no change in the mean income.

14. **Therefore, the change of the poverty rate over time  $P_{t+n} - P_t$  can be decomposed into a growth effect and a distribution effect.** The growth effect  $G$  is defined as the change in poverty because of a change in the mean income of the distribution, while assuming that the Lorenz  $L_t$  that reflects relative income inequalities does not change. The

distribution effect  $D$  is defined as the change in poverty because of a change in relative income inequality, while assuming the mean income remains constant at the reference level  $\mu_r$ .  $R$  is a residual.

$$P_{t+n} - P_t = G(t, t+n; r) + D(t, t+n; r) + R(t, t+n; r) \quad (1.2)$$

From (1.1 and 1.2), the growth effect is defined as:

$$G(t, t+n; r) \equiv P(z / \mu_{t+n}, L_r) - P(z / \mu_t, L_r) \quad (1.3)$$

and the distribution effect is defined as:

$$D(t, t+n; r) \equiv P(z / \mu_r, L_{t+n}) - P(z / \mu_r, L_t) \quad (1.4)$$

In both cases, there are residuals.

**15. The decomposition of the change in the poverty measure into two effects can be derived using two household surveys.** Generically (Datt and Ravallion, 1992), the poverty rate can be calculated as:

$$P_\alpha = \sum_{y_i < z} [(z - y_i) / z]^\alpha / n \quad (1.5)$$

where  $y_i$  is household income  $i$ ,  $z$  is the poverty line,  $n$  is the population size, and  $\alpha$  is a positive switch parameter. If  $\alpha = 0$ , the headcount poverty index is calculated, i.e., the proportion of the population that is poor. If  $\alpha = 1$ , the poverty gap index is calculated, i.e., the aggregate income shortfall of the poor as a proportion of the poverty line that is normalized by the population size. After this normalization, the growth and distribution effects can be calculated directly from 1.3 and 1.4 as in (DASP, 2014):

$$P_2 - P_1 = \underbrace{[P(\mu_{t2}, \pi_{t1}) - P(\mu_{t1}, \pi_{t1})]}_{\text{variation}} + \underbrace{[P(\mu_{t1}, \pi_{t2}) - P(\mu_{t1}, \pi_{t1})]}_{C1} + \underbrace{[P(\mu_{t2}, \pi_{t2}) - P(\mu_{t1}, \pi_{t2})]}_{C2} + R \quad /ref = 1 \quad (1.6)$$

$$P_2 - P_1 = \underbrace{[P(\mu_{t2}, \pi_{t2}) - P(\mu_{t1}, \pi_{t2})]}_{\text{variation}} + \underbrace{[P(\mu_{t1}, \pi_{t2}) - P(\mu_{t1}, \pi_{t1})]}_{C1} + \underbrace{[P(\mu_{t2}, \pi_{t2}) - P(\mu_{t2}, \pi_{t1})]}_{C2} + R \quad /ref = 2 \quad (1.7)$$

where  $\mu$  is the mean,  $\pi$  is population share of a group,  $C_1$  is growth component,  $C_2$  is redistribution component, and  $R$  is residual. Equation 1.6 uses period 1 as period of reference. In other words, it defines the growth and distribution effects by keeping the initial Lorenz Curve and initial mean income constant. The residual here, which can be written as

$$R_{ref=1} = [P(\mu_{t2}, \pi_{t2}) - P(\mu_{t1}, \pi_{t2})] - [P(\mu_{t2}, \pi_{t1}) - P(\mu_{t1}, \pi_{t1})] \quad (1.8)$$

$$\text{or} \quad = [P(\mu_{t2}, \pi_{t2}) - P(\mu_{t2}, \pi_{t1})] - [P(\mu_{t1}, \pi_{t2}) - P(\mu_{t1}, \pi_{t1})], \quad (1.9)$$

can be interpreted as the difference between the growth (redistribution) components evaluated at the terminal and initial Lorenz curve (mean incomes) (Datt and Ravallion, 1991). Equation 1.7 uses period 2 as the reference. The residual can be written as

$$R_{ref=2} = [P(\mu_{t2}, \pi_{t1}) - P(\mu_{t1}, \pi_{t1})] - [P(\mu_{t2}, \pi_{t2}) - P(\mu_{t1}, \pi_{t2})] \quad (2.0)$$

$$\text{or} \quad = [P(\mu_{t1}, \pi_{t2}) - P(\mu_{t1}, \pi_{t1})] - [P(\mu_{t2}, \pi_{t2}) - P(\mu_{t2}, \pi_{t1})]. \quad (2.1)$$

Note that  $R_{ref=1} = -R_{ref=2}$ . Therefore, it is possible to get rid of the residual by averaging the components obtained using period 1 and 2 as the reference<sup>6</sup>:

$$P_2 - P_1 = C_1 + C_2 \quad (2.2)$$

where  $C_1 = \{[P(\mu_{t2}, \pi_{t1}) - P(\mu_{t1}, \pi_{t1})] + [P(\mu_{t2}, \pi_{t2}) - P(\mu_{t1}, \pi_{t2})]\} / 2$ ,  
and  $C_2 = \{[P(\mu_{t1}, \pi_{t2}) - P(\mu_{t1}, \pi_{t1})] + [P(\mu_{t2}, \pi_{t2}) - P(\mu_{t2}, \pi_{t1})]\} / 2$ .

16. **The growth and distribution effects can be estimated using the Distributive Analysis STATA package.** It allows for calculating poverty and inequality indices, conducting decomposition procedures, and building growth incidence curve.<sup>7</sup> Instead of writing codes, DASP menus and dialog boxes can also be used. DASP also supports distributive analysis on more than one database.

### C. Growth Incidence Curves

17. **A dynamic measure of growth inclusiveness can be derived from growth incidence curves.** Growth incidence curves (GIC) help identify the extent to which each decile of households benefits from growth (Ravallion and Chen, 2003). In plotting GICs, the vertical axis reports the growth rate of consumption expenditure, and the horizontal axis reports consumption expenditure percentiles (Foster and others, 2013). Inclusive growth should simultaneously reduce poverty and inequality. Growth reduces poverty if the mean income of the poor rises. Growth reduces inequality if it helps straighten the Lorenz curve, which plots the percentage of total income earned by various portions of the population when the population is ordered by the size of their incomes. More formally, starting from Ravallion

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<sup>6</sup> An important constraint of this step is that by changing the reference period, the people that fall into the poverty group might change. This leads to a compositional concern that could reduce the transparency of the results.

<sup>7</sup> The latest DASP 2.3 version can be downloaded from <http://dasp.ecn.ulaval.ca/modules.htm>. A user manual is available from <http://dasp.ecn.ulaval.ca/manuals.htm>.

(continued...)

and Chen (2003), the growth incidence curve, which traces out the variability of consumption or the expenditure growth by the percentile of the population, can be defined as:

$$g_t(p) = \frac{L'_t(p)}{L'_{t-1}(p)} (\gamma_t + 1) - 1 \quad (2.3)$$

where  $L'_t(p)$  is the rate of change (slope) of the Lorenz curve<sup>8</sup>,  $p$  is the deciles of the population, and  $\gamma_t$  is the growth rate of its mean.

18. **The GIC assesses how consumption at each percentile changes over time. A stylized case allows for the identification of some characteristics of growth inclusiveness (Figure 2).** The parts of the curve above the X-axis are the deciles that benefit from growth, and the parts below the X-axis are the deciles that lost because of growth. If the GIC is above the X-axis, growth clearly leads to the reduction of poverty. However, if the GIC crosses the X-axis, the impact of growth on poverty is ambiguous. The parts of the curve that are above the overall mean point at the deciles of the population that benefit from growth relatively more than an average household. The parts of the GIC below the mean, but still above zero, point at the deciles that also benefit from growth, but less than an average household.

19. **GICs allow for the calculation of different growth averaging measures. Median income growth is the change in income of the household at the midpoint of a frequency distribution.** Growth in mean income is the change in the income of an average household in the whole distribution. The mean growth rate is the average income growth of the poor, i.e., only of those households that are below the poverty line.<sup>9</sup> Therefore, the quotient of mean growth income to growth in mean measures shifts in the distribution. Obviously, growth in mean virtually always will be different from mean growth. When mean growth is higher than growth in mean, growth can be considered pro-poor, but not yet inclusive as the comparisons of means say nothing about growth at different deciles.

20. **Schematically, there are several possible economic interpretations of the outcomes in GIC calculations.** In a very simplified linear case (3), the mean growth of consumption or the expenditure per decile can be (1) zero, where the economy in per capita terms does not grow at all—in this case, GIC overlaps with the X-axis; (2) positive, with the GIC above the X-axis or negative in the opposite case; (3) zero and non-inclusive, as the GIC with a zero mean is positively sloped, suggesting an absence of growth on average, as negative growth at lower deciles is completely offset by higher growth in higher deciles of

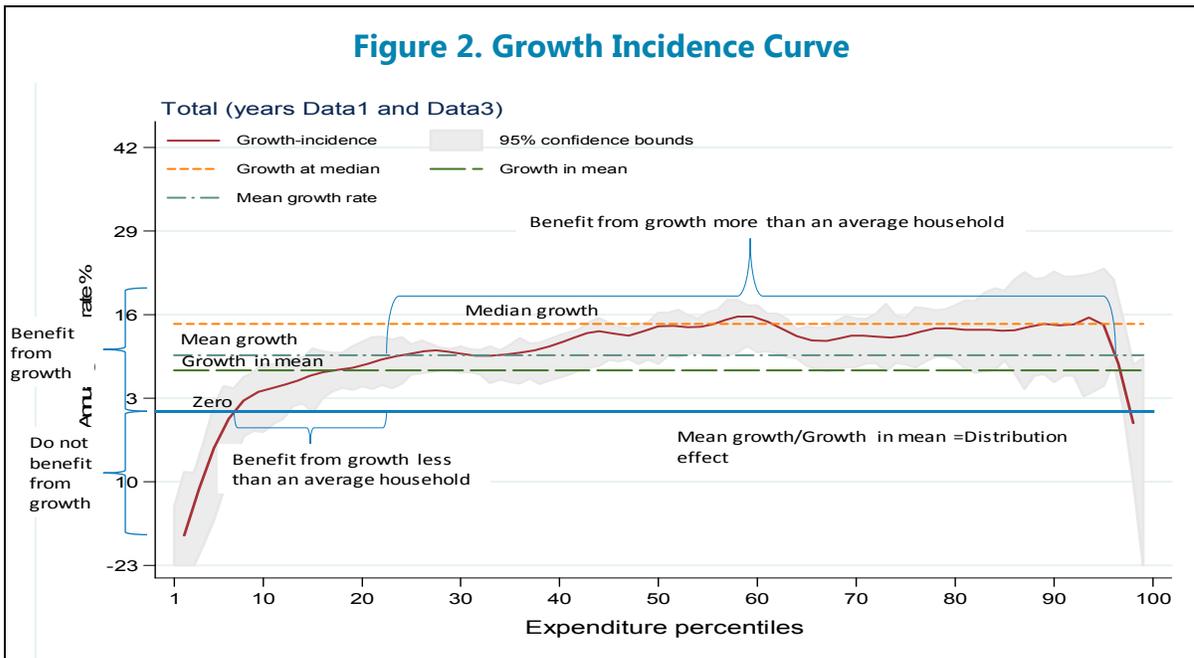
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<sup>8</sup>  $L'_t(p)$  is the fraction at time  $t$  of total income that the holders of the lowest  $p$ th fraction of incomes possess. This varies from zero to one,  $0 \leq p \leq 1$ , and is presented as the inverse of the cumulative distribution function.

<sup>9</sup> Ravallion-Chen (2003) call it “rate of pro-poor growth” given by the change in the Watts index divided by the initial poverty headcount index.

the income distribution, which shows increased inequality, and, therefore, a lack of inclusiveness; (4) zero but inclusive, which is the opposite case with a negatively sloped GIC that still points at no growth, but suggests some inclusiveness as the expenditure of lower deciles of the distribution grows while that of the higher deciles declines; (5) positive and non-inclusive, as the mean consumption increases by GIC is positively sloped; or (6) positive and inclusive, where the mean consumption increases and the GIC is negatively sloped.

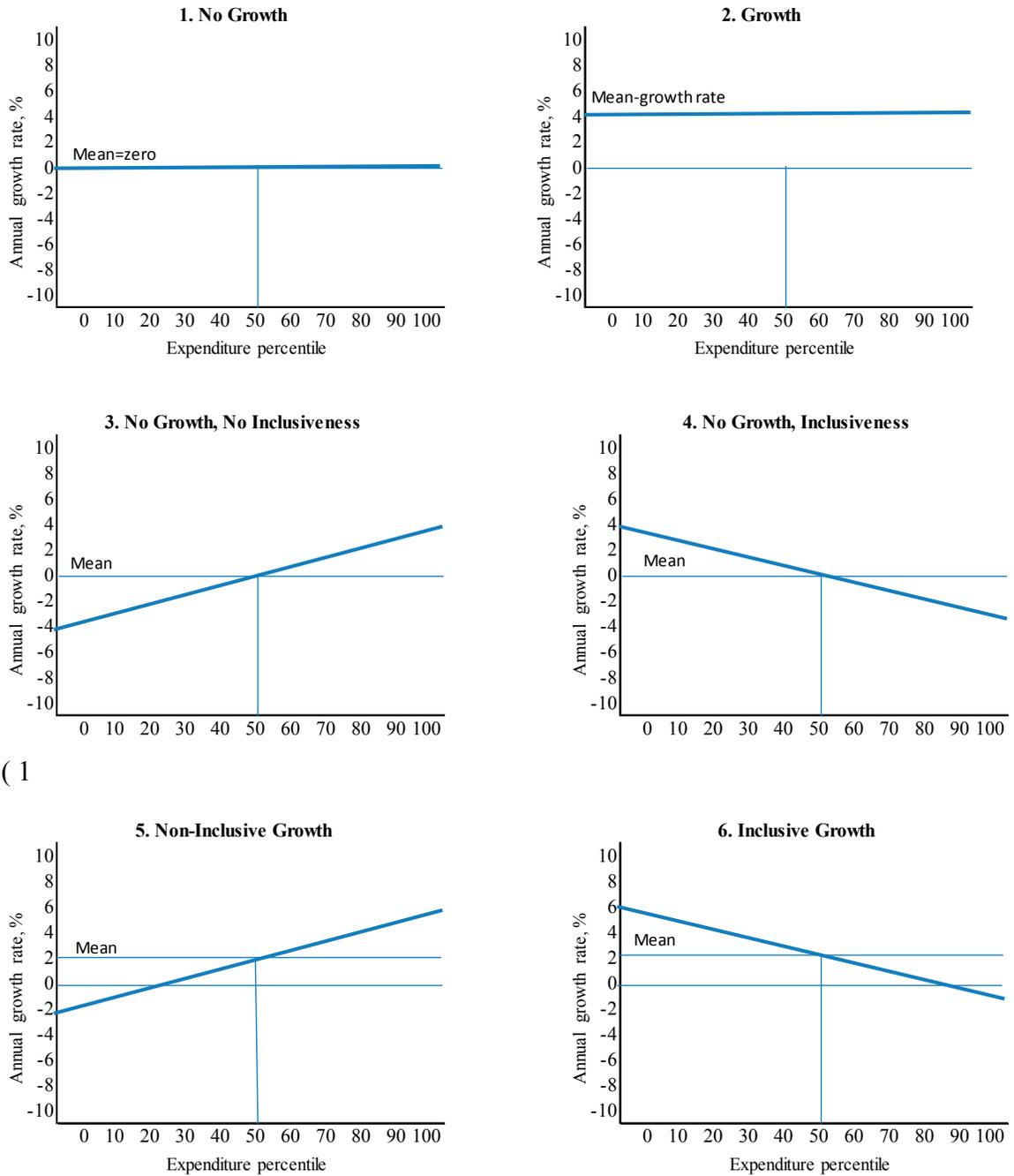
21. **Changes either in growth or inclusiveness would displace the GIC.** There can be several cases where this would occur (4): (1) an increase in growth with unchanged inclusiveness would shift the GIC up; (2) an increase in inclusiveness, but not in growth would tilt the GIC and make its slope more negative; (3) an increase in inclusive growth would simultaneously shift the GIC up and make its slope more negative; and (4) an increase in growth accompanied by worsened inclusiveness would be manifested by an upward shift of the GIC in parallel with the decline of its negative slope, making it positively sloped. Obviously, there can be other possible combinations of shifts.



Source: Author's presentation.

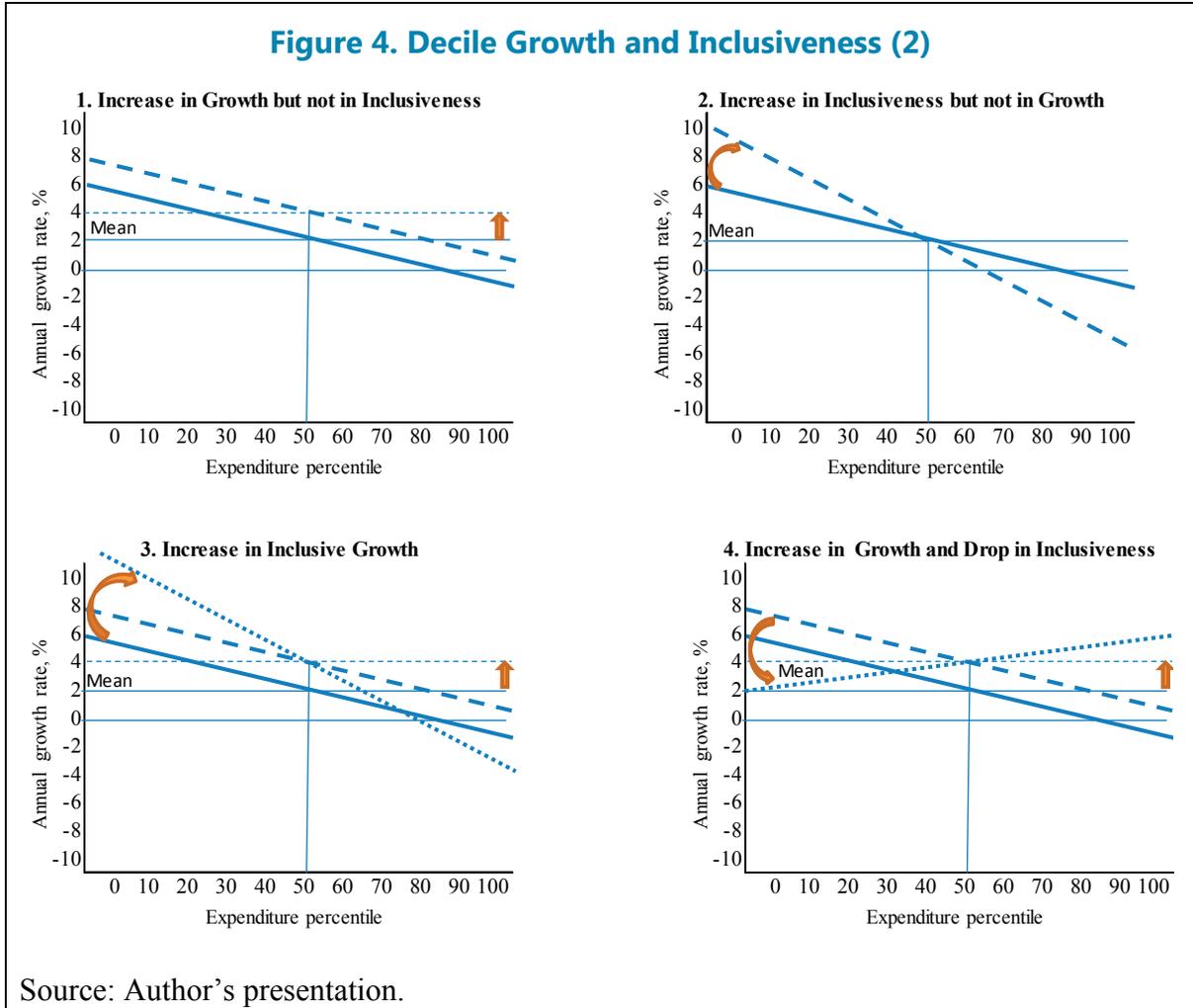
Indicator	Interpretation
Growth in mean	average expenditure growth for the whole population
Mean growth	average expenditure growth for the population below the poverty line
Median growth	expenditure growth of a household at the midpoint of households distribution
Mean growth/growth in mean	growth of the expenditure of the poor relative to the average household expenditure
Mean growth > growth in mean	pro-poor growth, expenditure of the poor increases faster than the average overall expenditure
Mean growth < growth in mean	contra-poor growth, expenditure of the poor increase slower than the average overall expenditure
Median growth > mean growth	most households have high average expenditure growth, expenditure growth distribution is skewed to the right
Median growth < mean growth	most households have low average expenditure growth, expenditure growth distribution is skewed to the left

**Figure 3. Decile Growth and Inclusiveness (1)**



(1)

Source: Author's presentation.



22. **The slope of the GIC points at the distributional characteristics of growth.** A completely horizontal GIC suggests that growth has been neutral from the distributive perspective. A negatively sloping GIC points at inclusive growth. It suggests that the income or spending of the poorer deciles of the population grows faster than the income or spending of the richer deciles. The slope of the incidence curve is negative if:

$$g'_t(p) = \frac{L''_t L'_{t-1} - L'_t L''_{t-1}}{(L'_{t-1})^2} < 1 \quad (2.4)$$

because, in this case, where the poorer groups are catching up with the richer, a negatively sloping GIC can be viewed as one of the indications of growth inclusiveness. A positively sloped GIC clearly indicates that growth has not been inclusive. Improvements in the degree of growth inclusiveness would be signaled by the GIC changing the slope from positive to negative, and progress in poverty reduction would lead to the mean of the GIC and the curve itself moving up (for further theoretical considerations of GICs, see A. Kireyev, 2013).

**23. More formally, assume that the ratio of the rate of change of the Lorenz curve is linear:**

$$\frac{L'_t(p)}{L'_{t-1}(p)} = \alpha + \beta p \quad (2.5)$$

Then 
$$g_t(p) = (\alpha + \beta p)(\gamma_t + 1) - 1 \quad (2.6)$$

or 
$$g_t(p) = \alpha(\gamma_t + 1) - 1 + \beta(\gamma_t + 1)p \quad (2.7)$$

Obviously,  $g_t(p)$  shifts up or down by  $\alpha$  and changes its slope depending on  $\beta$ .

From equation (2.3) it follows that:

- $g_t(p) = \gamma_t$ , if  $L'_t(p) = L'_{t-1}(p)$ : growth at each decile of incidence curve will be equal to the average growth of the distribution at each decile of the population, if the slope of the Lorenz curve does not change over time.
- $g_t(p) > \gamma_t$ , if  $L'_t(p) > L'_{t-1}(p)$ : growth at each decile of the incidence curve will be higher than the average growth of the distribution at each decile of the population, if the slope of the Lorenz curve increases over time.
- $g_t(p) < \gamma_t$ , if  $L'_t(p) < L'_{t-1}(p)$ : growth at each decile of the incidence curve will be lower than the average growth of the distribution at each decile of the population, if the slope of the Lorenz curve decreases over time.

- The slope of the incidence curve is positive if:

$$g'_t(p) = \frac{L''_t L'_{t-1} - L'_t L''_{t-1}}{(L'_{t-1})^2} > 1$$

- The slope of the incidence curve is negative if:

$$g'_t(p) = \frac{L''_t L'_{t-1} - L'_t L''_{t-1}}{(L'_{t-1})^2} < 1$$

**24. From an operational perspective, to assess inclusiveness of growth a country should take a number of actions:** (i) establish the slope of the incidence curve based on the information of at least two sequential household surveys; (ii) if the slope is positive, suggesting that growth has not been inclusive, identify measures that could increase the income and spending of the lowest deciles, while increasing the mean growth rate, that is, not at the expense of higher deciles; (iii) if the slope of the incidence curve is negative, suggesting growth has been inclusive, identify measures to increase the absolute value of the slope by making the growth of consumption of lower deciles even faster, without hampering any other deciles; and, alternatively or in addition, (iv) find a measure to reduce inequality in the Lorenz curve coefficient in the next period that would shift the entire incidence curve up.

**25. The linear form of the growth incidence curve is a simplification assumption taken to illustrate its key properties better.** Growth incidence curves usually have complex shapes, reflecting growth in consumption or expenditure at each decile of the population. The

analysis for the purposes of public policies should be performed on carefully constructed growth incidence curves based on the two most recent household surveys.

### III. APPLICATIONS

#### A. Senegal: urban and rural dimensions

26. **In the case of Senegal (see for details Kireyev, 2013), the growth incidence curves give somewhat conflicting signals on distributional shifts in in this country, they seem to confirm that growth benefitted most people in the middle of the income distribution.**

Between 2001 and 2005 (Figure 5), consumption increased on average because the mean of the growth incidence curve is above zero, driven by the middle of the distribution (from the 3<sup>rd</sup> to the 8<sup>th</sup> deciles). The growth incidence curve is positively sloped, suggesting some increase in inequality during this period. Between 2005 and 2011, the mean of the growth incidence curve is above zero, but the curve is broadly flat, suggesting no clear trend in changes in inequality. On average for 2001–2011, a clear increase in mean consumption confirms the decline in poverty, as the middle class improved their relative position.

However, for 2001–11 the growth incidence curve has a slightly positive slope, which may point to some worsening of inclusiveness. This trend may not be statistically significant, indicating no substantial distributional changes during this period other than the improvement in the relative position of the middle class.

27. **The GIC calculated using data of 2001 and 2011 for Senegal does not reflect the average change between the two periods.** The latter seems to be better reflected by taking the average of 2001–2005 and 2005–2011. The fact that only two sample periods may raise concern whether these two periods are representative of the 2001–2011 period. For instance, the consumption distribution could be very different from 2009, 2010, and 2012, and thus the results calculated cannot be readily generalized.

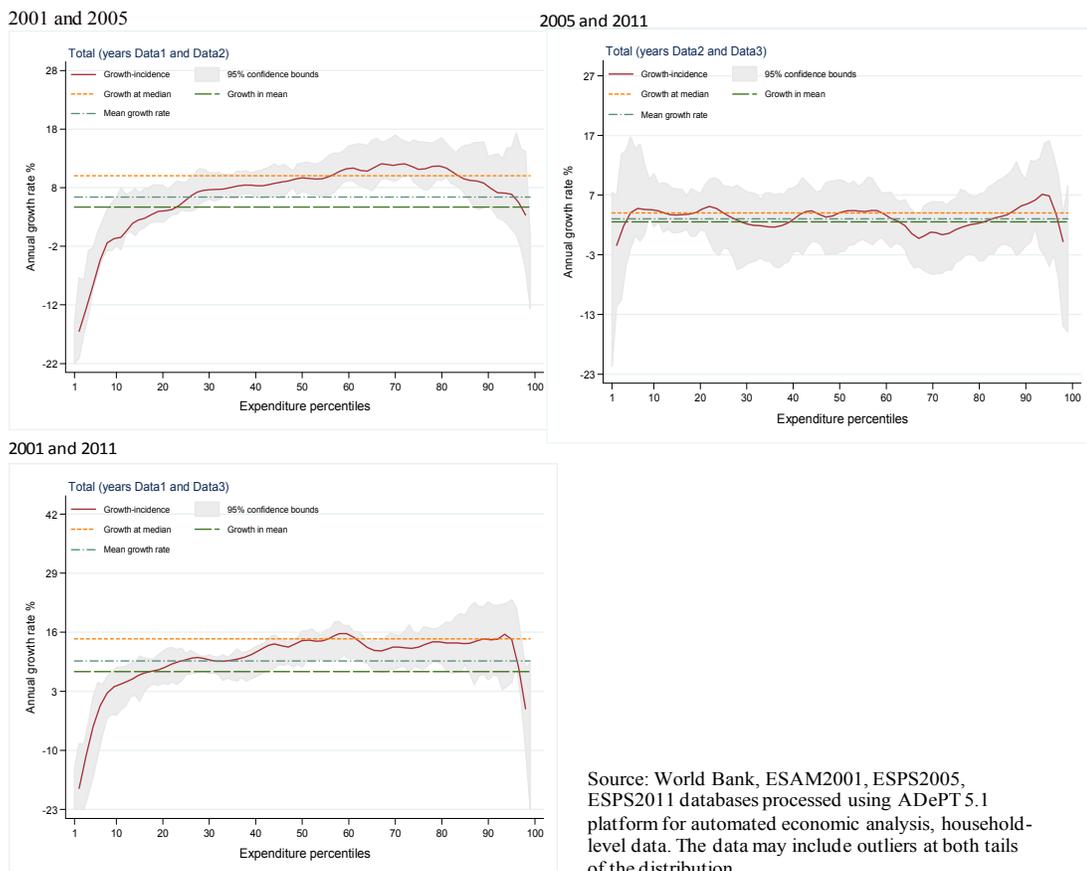
28. **This overall result, however, masks significant differences in growth inclusiveness between urban and rural areas.** In urban areas people in the middle of the distribution seem to have benefitted the most from growth. Between 2001 and 2005, the growth incidence curve for urban areas is substantially above the mean for the whole distribution other than the top decile; but it slopes down a little, suggesting somewhat reduced disparity between the rich and the poor (Figure 6). For 2005–2011, however, the incidence curve hovers around zero and is upward sloping, pointing to some worsening of inclusiveness. For 2001–2011 overall, again there is no clear trend, although growth of consumption of the middle decile was very strong. Although the incidence curve is above zero it looks broadly flat, pointing to unchanged inclusiveness.

29. **The degree of inclusiveness of growth in rural areas has an important impact on the degree of inclusiveness of growth in Senegal (Figure 7).** The difference between the median growth rates of spending by households in rural areas is closer to the mean growth

rate than in urban areas. This may suggest that the overall change in the distribution of households' consumption is heavily influenced by the changes in the distribution in rural areas and that it is skewed to the right, because most households are relatively poorer than the mean household in the country. On the contrary, in urban areas the impact of changes in growth rates of consumption of relatively rich households on the overall inclusiveness of growth is less significant, because the distribution in urban areas is skewed to the left—most households are relatively richer than the mean household in the country.

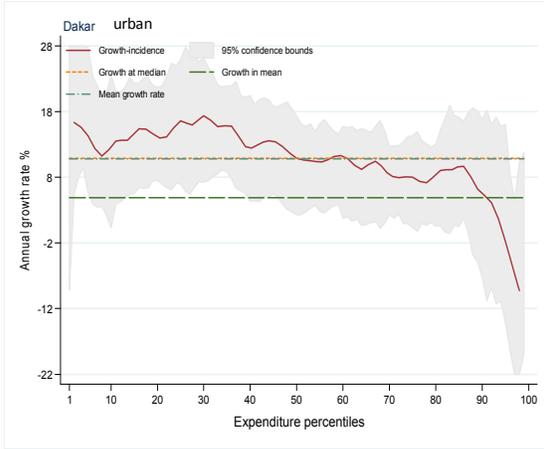
30. **Although available indicators sometimes give conflicting signals on distributional shifts in Senegal, the statistical analysis of the distributional characteristics of growth suggests the following:** (i) poverty in this country has fallen in the last two decades, although poverty reduction has slowed in recent years; (ii) although available indicators sometimes give conflicting signals on distributional shifts, growth seems to have benefitted most people in the middle of the income distribution; (iii) the middle class has benefitted from growth, mainly in urban areas, while both the poorest and the richest have lost ground.

**Figure 5. Growth Incidence in 2001–05, 2005–11, and 2001–11**

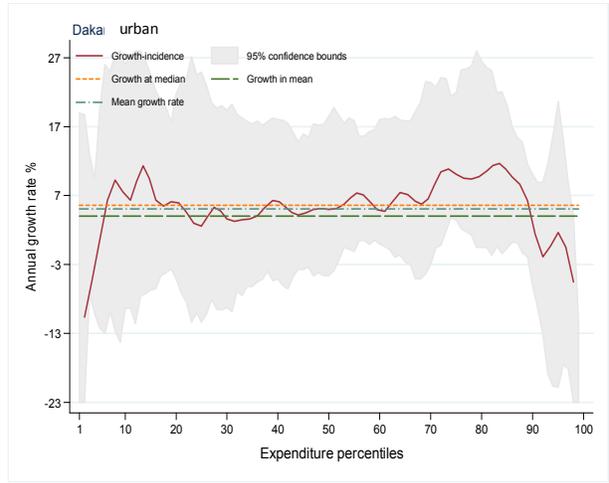


**Figure 6. Senegal: Growth Incidence in Urban Areas, 2001-05, 2005-11, and 2001-11**

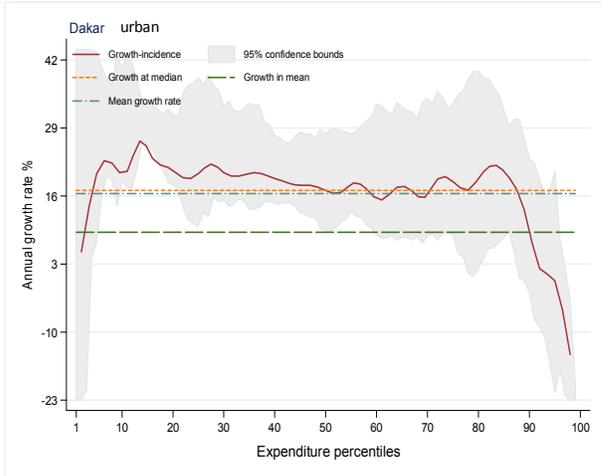
2001 and 2005



2005 and 2011

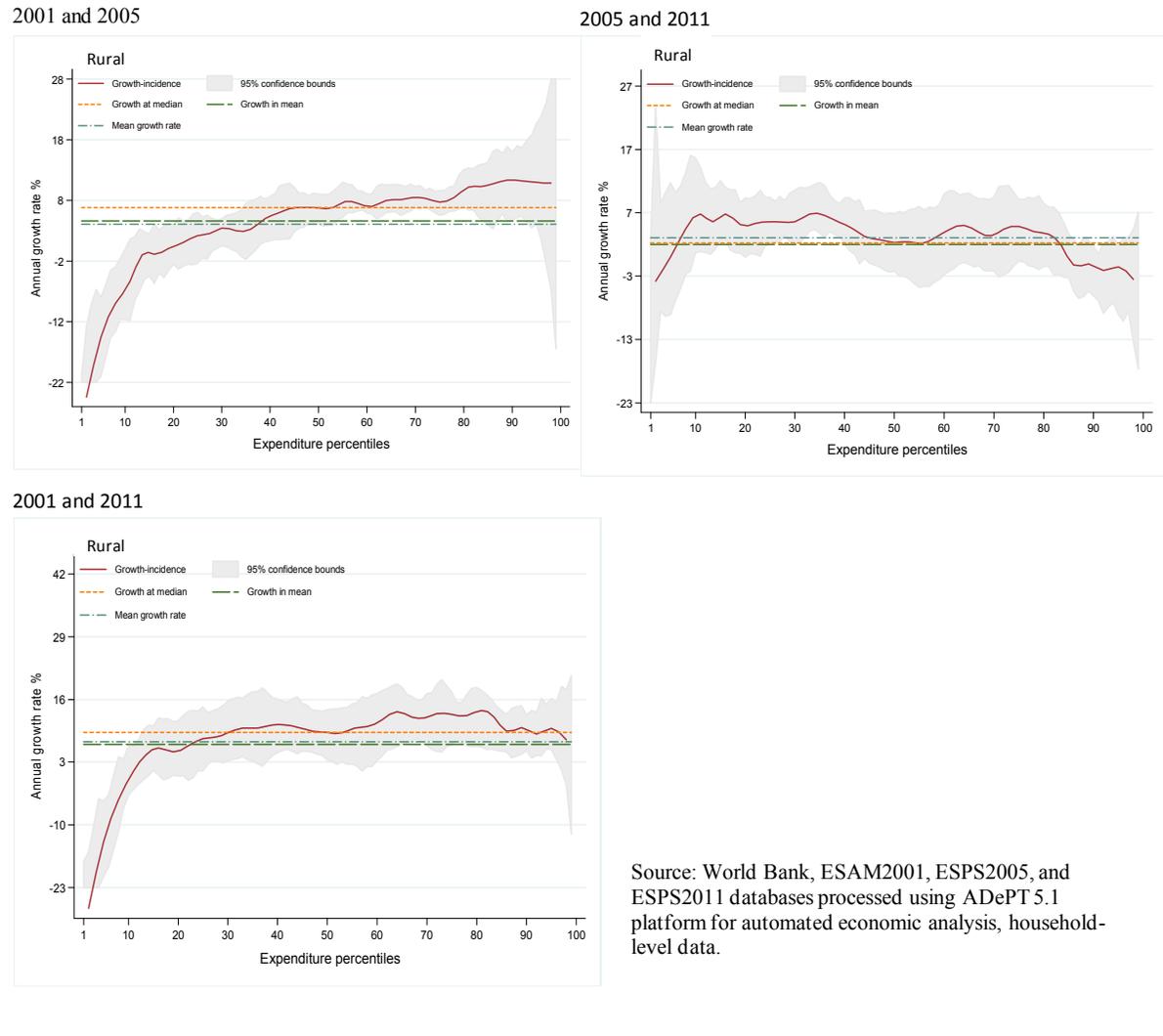


2001 and 2011



Source: World Bank, ESAM2001, ESPS2005, and ESPS2011 databases processed using ADePT 5.1 platform for automated economic analysis, household-level data.

**Figure 7. Senegal: Growth Incidence in Rural Areas, 2001-05, 2005-11, and 2001-11**



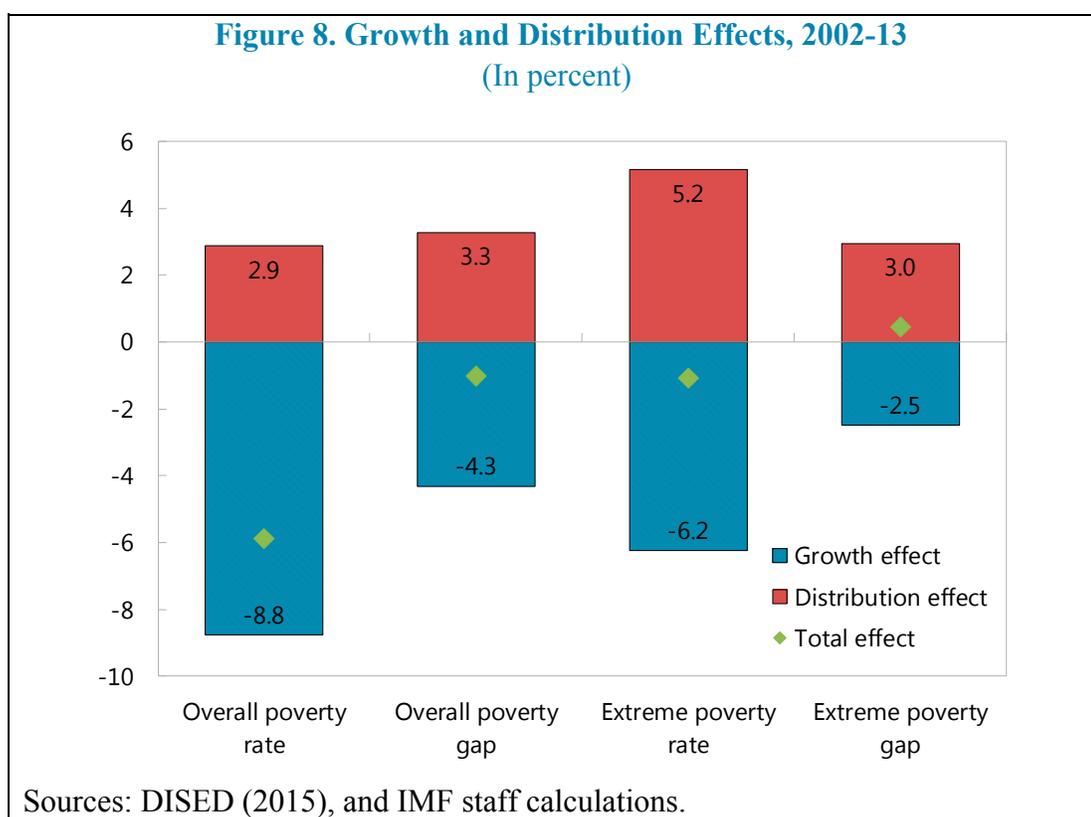
## B. Djibouti: growth and distribution effects

31. **In this case of Djibouti (for details see Kireyev, 2017), the growth inclusiveness analysis is based on two household surveys.** These surveys were conducted in 2002 and 2012, and updated in 2013.<sup>10</sup> This country's growth has been solid in the past decade, but it has not led to a visible poverty reduction. Based on new poverty thresholds calculated in 2013, extreme poverty reduced from 24.1 percent in 2002 to 23 percent in 2013. At the same time, overall poverty dropped from 46.7 percent to 40.8 percent (EDAM2-2002, EDAM3-

<sup>10</sup> Enquête d'Auprès des Ménages pour les Indicateurs Sociaux–Budget et Consommation, (EDAM2-2002, EDAM3-2012 et EBC-2013).

2012 and EBC-2013). These aggregated indicators mask substantial differences in poverty levels within the country. In the capital, both the extreme and overall poverty rates were substantially lower than the average, at 16.5 and 34.2 percent, correspondingly, while in the rest of the country the rates were 44.5 and 62.5 percent, respectively.

32. **In this country case, growth and distribution effects impact the poverty rate in opposite directions.** For example, in 2013 relative to 2012, the overall poverty rate dropped by 5.9 percentage points (ppts), of which the growth effect contributed 8.8 ppts, while the distribution effect worked in the opposite direction and subtracted 2.9 ppts (Figure 8). As for extreme poverty, the improvement was marginal, only 1 ppt, as most of the gains for poverty reduction from growth was offset by losses from the distribution effect.



33. **The impact of the growth and distribution effects on the poverty gap was somewhat different.** The improvement in the overall poverty gap was marginal, at about one percentage point, again because the positive contribution of the growth effect was almost entirely offset by the negative impact of the distribution effect. For extreme poverty, the gap increased by about 0.5 percentage points, as the contribution of the distribution effect was strongly negative and could not be offset by the growth effect.

34. **At a more granular level, different approaches to the calculations of both effects give broadly similar results.** Period 1 refers to 2002, period 2 refers to 2013, the reference

years when the mean income is held as a constant to get the redistribution effects, and when the distribution is held constant to calculate the growth effect (Figure 9). The Shapley method takes both years as reference and divides them by two to get the average level of effects (for details, see DASP Manual, 2013).

**Figure 9. Growth and Distribution Effects by Poverty Measure and Approach, 2002-13**

a. Overall Poverty Headcount					b. Overall Poverty Gap									
Parameter alpha : 0		Threshold:		2002	2013	Parameter alpha : 1		Threshold:		2002	2013			
Poverty line :				94,636	147,936	Poverty line :				94,636	147,936			
	Estimate	St. error	Lower bound	Upper bound		Estimate	St. error	Lower bound	Upper bound		Estimate	St. error	Lower bound	Upper bound
Distribution_1	0.4670	0.0213	0.4251	0.5089	Distribution_1	0.1689	0.0105	0.1482	0.1896	Distribution_1	0.1689	0.0105	0.1482	0.1896
Distribution_2	0.4081	0.0223	0.3641	0.4520	Distribution_2	0.1586	0.0104	0.1383	0.1790	Distribution_2	0.1586	0.0104	0.1383	0.1790
Difference: (d2-d1)	-0.0589	0.0454	-0.1483	0.0304	Difference: (d2-d1)	-0.0103	0.0210	-0.0517	0.0311	Difference: (d2-d1)	-0.0103	0.0210	-0.0517	0.0311
Datt & Ravallion approach: reference period t1					Datt & Ravallion approach: reference period t1					Datt & Ravallion approach: reference period t1				
Growth	-0.0908	0.0542	-0.1976	0.0159	Growth	-0.0434	0.0240	-0.0907	0.0038	Growth	-0.0434	0.0240	-0.0907	0.0038
Distribution	0.0256	0.0550	-0.0825	0.1338	Distribution	0.0326	0.0150	0.0031	0.0620	Distribution	0.0326	0.0150	0.0031	0.0620
Residual	0.0063	---	---	---	Residual	0.0006	---	---	---	Residual	0.0006	---	---	---
Datt & Ravallion approach: reference period t2					Datt & Ravallion approach: reference period t2					Datt & Ravallion approach: reference period t2				
Growth	-0.0845	0.0342	-0.1518	-0.0173	Growth	-0.0428	0.0143	-0.0709	-0.0148	Growth	-0.0428	0.0143	-0.0709	-0.0148
Distribution	0.0319	0.0440	-0.0546	0.1184	Distribution	0.0331	0.0206	-0.0073	0.0736	Distribution	0.0331	0.0206	-0.0073	0.0736
Residual	-0.0063	---	---	---	Residual	-0.0006	---	---	---	Residual	-0.0006	---	---	---
Shapley approach					Shapley approach					Shapley approach				
Growth	-0.0877	0.0283	-0.1434	-0.0319	Growth	-0.0431	0.0419	-0.1255	0.0392	Growth	-0.0431	0.0419	-0.1255	0.0392
Distribution	0.0288	0.0236	-0.0176	0.0751	Distribution	0.0329	0.0173	-0.0011	0.0668	Distribution	0.0329	0.0173	-0.0011	0.0668
c. Extreme Poverty Headcount					d. Extreme Poverty Gap									
Parameter alpha : 0		Threshold:		2002	2013	Parameter alpha : 1		Threshold:		2002	2013			
Poverty line :				63,145	98,709	Poverty line :				63,145	98,709			
	Estimate	St. error	Lower bound	Upper bound		Estimate	St. error	Lower bound	Upper bound		Estimate	St. error	Lower bound	Upper bound
Distribution_1	0.2411	0.0172	0.2073	0.2750	Distribution_1	0.0741	0.0061	0.0621	0.0860	Distribution_1	0.0741	0.0061	0.0621	0.0860
Distribution_2	0.2304	0.0179	0.1951	0.2657	Distribution_2	0.0785	0.0065	0.0658	0.0913	Distribution_2	0.0785	0.0065	0.0658	0.0913
Difference: (d2-d1)	-0.0107	0.0363	-0.0821	0.0606	Difference: (d2-d1)	0.0045	0.0128	-0.0208	0.0297	Difference: (d2-d1)	0.0045	0.0128	-0.0208	0.0297
Datt & Ravallion approach: reference period t1					Datt & Ravallion approach: reference period t1					Datt & Ravallion approach: reference period t1				
Growth	-0.0635	0.0360	-0.1344	0.0073	Growth	-0.0234	0.0123	-0.0477	0.0009	Growth	-0.0234	0.0123	-0.0477	0.0009
Distribution	0.0506	0.0443	-0.0365	0.1378	Distribution	0.0311	0.0107	0.0101	0.0522	Distribution	0.0311	0.0107	0.0101	0.0522
Residual	0.0021	---	---	---	Residual	-0.0033	---	---	---	Residual	-0.0033	---	---	---
Datt & Ravallion approach: reference period t2					Datt & Ravallion approach: reference period t2					Datt & Ravallion approach: reference period t2				
Growth	-0.0614	0.0285	-0.1174	-0.0053	Growth	-0.0267	0.0091	-0.0446	-0.0088	Growth	-0.0267	0.0091	-0.0446	-0.0088
Distribution	0.0528	0.0317	-0.0096	0.1152	Distribution	0.0279	0.0116	0.0051	0.0506	Distribution	0.0279	0.0116	0.0051	0.0506
Residual	-0.0021	---	---	---	Residual	0.0033	---	---	---	Residual	0.0033	---	---	---
Shapley approach					Shapley approach					Shapley approach				
Growth	-0.0625	0.0344	-0.1301	0.0051	Growth	-0.0250	0.0414	-0.1066	0.0565	Growth	-0.0250	0.0414	-0.1066	0.0565
Distribution	0.0517	0.0217	0.0089	0.0945	Distribution	0.0295	0.0110	0.0079	0.0511	Distribution	0.0295	0.0110	0.0079	0.0511

Sources: DISED (2016) EDAM, EBC databases, and IMF staff calculations.

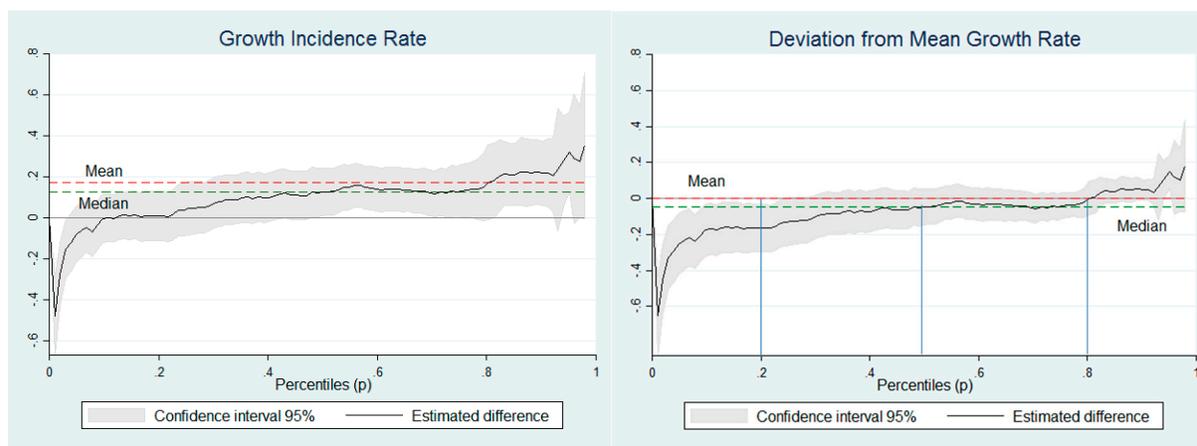
35. **All measures and approaches, other than the extreme poverty gap index, suggest that poverty declined.** The extreme poverty gap shows an increase of about 0.4 percent, as the distribution effect that increases poverty dominates over the growth effect that reduces poverty. All other cases show a reduction of poverty, although extremely marginal, at about 5.9 ppts for the overall poverty headcount, 1 ppt for the overall poverty gap, and 1.1 ppts for the extreme poverty headcount. Absent the distribution effect, which in all cases negatively

affected poverty measures, poverty reduction would have been substantially higher. Finally, the confidence intervals suggest that the statistical significance of these findings is relatively low.

36. **Therefore, the distribution effect has worked in the opposite direction from the growth effect in terms of its impact on poverty.** In other words, poverty reduction could have been substantially higher if the distribution effect had been at least neutral or positive. Although the evidences of both effects are characterized by low statistical significance, they attest to the need to decompose any change in the poverty measure into these two effects, and select policies that would ensure that both effects work in the direction of poverty reduction and do not conflict with each other.

37. **In this Djibouti, growth has benefited most people in the middle and high end of the income distribution.** In 2002-13, household consumption increased on average as the mean of the GIC is above zero, driven by the middle of the distribution (from the 2<sup>nd</sup> to the 10<sup>th</sup> deciles) (Figure 10). The GIC is clearly positively sloped, suggesting an increase in inequality during this period. This trend is visible, but may not be statistically significant, indicating no substantial distributional changes during this period other than the improvement in the relative position of the middle class. These overall results, however, may mask significant differences in growth inclusiveness between urban and rural areas, and men and women.

**Figure 10. Growth Incidence Curve, Original and Displaced, 2002-13**



Source: DISED (2016), and IMF staff calculations.

38. **The GIC suggests that the consumption of the poorest parts of the population declined.** In 2002-13, for the low percentiles the GIC is located below the horizontal axis, indicating that at least 10 percent of the poorest groups of the population experienced a negative growth rate of their living standards. As a result, poverty among the poorest of this country's population increased further. Also, the 95 percent confidence interval around the

GIC touches the X-axis several times, particularly in the 5th to the 8th percentiles, suggesting a substantial margin of error as the results are marginally statistically significant. Thus, the change of consumption even of middle-income groups also could have been negative. This error may explain why most indicators do not point at any reduction of poverty in this country. Consumption of the high-income deciles at above the 8<sup>th</sup> decile clearly increased. They became richer.

39. **Shifting the GIC down by aligning its mean with the X-axis helps to understand the distributional impact of growth better.** Up to the 8<sup>th</sup> decile percent of the population, the curve is below the X-axis. For them, the growth rate of their consumption was lower than the growth rate calculated at the middle percentile. In other words, for 80 percent of the poorest of the population, consumption grew slower relative to the wealthiest 20 percent. This is an indication that the distribution effect has had an opposite trend from the growth effect and has led to more inequality. The GIC also suggests that the two poorest deciles clearly experienced lower growth of consumption even relative to an average. In this country, the 95 percent confidence interval is squarely below the horizontal axis. Finally, for the middle of the distribution, roughly from the 2<sup>nd</sup> to the 8<sup>th</sup> decile, the trend still points at a worsening of growth inclusiveness, although it may not be statistically significant as the confidence interval crosses the X-axis multiple times.

40. **The analysis of growth inclusiveness in this country leads to the following conclusions:** (i) overall poverty in this country has declined in 2002-13, although there has been no significant changes in extreme poverty; (ii) inequality in this country remains high, in particular between different income groups, and there are indications that inequality may have worsened; (iii) in 2002-13, growth has not been inclusive, as it mainly benefitted people on the upper side of the income distribution, while the poorest groups became even poorer in relative terms; (iv) based on the experiences of other comparator countries, growth in rural areas most likely was less inclusive than in urban areas, and gender disparity might have increased, although the existing statistics for this country does not allow for the direct assessment of these two effects; and (v) the underlying data is marginally sufficient for the growth inclusiveness analysis and is not entirely comparable between surveys, and as the statistical significance of most estimates is low and the margins of error are high, the results should be treated only as indicative pending better data availability.

#### IV. CONCLUSIONS

41. **The inclusive growth framework (IGF) allows for the analysis of growth, poverty, and inequality in a coherent manner.** Each of the three mentioned components can be quantified in terms of their impact on growth inclusiveness. In addition, the breakdown of the poverty change measure into the distribution and growth effects, and the breakdown of the growth measure into the decile effects, allow to identify at least some factors that promote and impede improvements in growth inclusiveness. Clearly, a much

more comprehensive diagnostic exercise would be needed to identify bottlenecks to inclusive growth and come up with policy recommendations. While the growth and distribution effects show what helps and hampers the reduction of poverty, the growth incidence curve allows for the identification of households that need the most help in order to improve growth inclusiveness. Therefore, the GIC, which is based on granular household surveys, gives clear policy guidance on how to replace generalized and inefficient subsidies and other incentives with well-targeted support measures.

42. **Policies to increase growth inclusiveness should aim to reform these three components—growth, poverty, and inequality (Box 1).** Policies for strong per capita growth include efficient investment, growth-friendly tax policies, structural reforms to unlock the potential of the private sector, and the support of monetary policies. Policies to reduce poverty include, mainly in this context, reforms aimed at eliminating the negative impact of the distribution effect on growth that simultaneously preserve and enhance the growth effect. Finally, policies to improve the decile effect on growth inclusiveness consist of measures capable of changing the slope of the GIC from positive to negative, and increasing the negatively sloped GIC.

#### **Box 1. Policies to Increase Growth Inclusiveness**

Sustained economic growth and well-designed public policies are the preconditions.

##### **Structural policies (pre-distribution policies)**

- Improve access to education and healthcare
- Build inclusive institutions
- Promote gender inclusiveness
- Accelerate infrastructure reforms (energy, irrigation)
- Introduce flexible labor market policies

##### **Fiscal policies (redistribution policies)**

- Cut (progressive) direct taxes
- Increase (regressive) indirect taxes
- Increase the tax base – reduce informality
- Increase public investment

##### **Financial sector policies**

- Improve access to financial services
- Align financial reforms with capacity

##### **Agricultural policies**

- Improve productivity, reduce productivity gap
- Eliminate unproductive subsidies

43. **The reforms aimed at improving growth inclusiveness consist of pre-distribution policies and distribution policies.** Sustained economic growth and well-designed public policies are the preconditions for inclusive growth. Pre-distribution policies mainly focus on inclusive institutions, gender inclusiveness, infrastructure reforms (ex., energy and irrigation), flexible labor market policies, agricultural reforms, and the removal of structural impediments that deny access to areas such as education and healthcare. For distribution, the emphasis is on fiscal and financial sector policies. On the fiscal side, increases in progressive direct taxes, cuts in regressive indirect taxes, reductions of the informal sector to expand the tax base, and increases in public investment are included in the usual recommended set of options. Lastly, concerning the financial sector, policies to increase access to financial services, while aligning financial reforms with capacity, are usually the preferred courses of action.

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