



## Three essays on inclusive growth

Djeneba Doumbia

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**UNIVERSITE PARIS I PANTHEON-SORBONNE**

UFR DES SCIENCES ECONOMIQUES

AND

**PARIS SCHOOL OF ECONOMICS**

Thèse pour l'obtention du titre de Docteur en Sciences Economiques  
présentée et soutenue publiquement à Paris le 19 Décembre 2018 par

**DJENEBA DOUMBIA**

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## **Three Essays on Inclusive Growth**

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### **DIRECTEUR DE THÈSE**

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### **MEMBRES DU JURY**

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Professeur, Université Clermont Auvergne, Ecole d'Economie, CERDI

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## Summary

This dissertation provides some evidence-based policy lessons focusing on the role of institutional, structural, and fiscal policies in achieving pro-poor and inclusive growth. The first chapter gives an overview of the dissertation and briefly discusses the main data issues and some stylized facts on inequality and poverty. The second chapter examines the role of good governance in fostering pro-poor and inclusive growth at the macroeconomic level. It shows that while all features of good governance enhance pro-poor growth, only government effectiveness and the rule of law tend to promote inclusive growth. The third chapter provides a cross-country analysis investigating how governments can reduce income inequality by changing the composition of public spending while keeping the total level fixed. The results show that reallocating defense spending towards education, and health spending and in particular social and infrastructure spending, is associated with reduced income inequality in countries with political stability. The fourth chapter provides a microeconomic perspective, focusing on how better performance of informal firms could promote shared prosperity in a context of fragility. It shows that firms' performance is a key factor in explaining income differences between entrepreneurs. In addition, the chapter finds that human capital and managerial skills are important engines of informal firms' performance.

**Keywords:** Inclusive growth, Pro-poor growth, Inequality, Poverty, Public spending, Spending composition, Informal sector, Firm performance.

## Résumé

Cette thèse met en exergue des recommandations sur le rôle des politiques de gouvernance, structurelles et fiscales pour atteindre une croissance pro-pauvre et inclusive. Le premier chapitre qui est introductif, présente le contexte de la thèse et discute brièvement les principaux problèmes de données ainsi que les faits stylisés sur l'inégalité et la pauvreté. Le deuxième chapitre analyse les effets de la bonne gouvernance sur la croissance pro-pauvre et inclusive au niveau macroéconomique. Il montre que tous les indicateurs de la gouvernance impactent positivement la croissance des revenus et la réduction de la pauvreté tandis que seuls deux indicateurs : l'efficacité du gouvernement et la règle de droit favorisent une croissance inclusive. Le troisième chapitre analyse comment les gouvernements peuvent réduire les inégalités de revenu en ajustant la composition des dépenses publiques tout en gardant le niveau total inchangé. Les résultats montrent que réallouer les dépenses de défense vers les dépenses d'éducation et de santé et en particulier les dépenses sociales et d'infrastructure, est associé à une réduction des inégalités dans les pays avec une stabilité politique. Le quatrième chapitre fournit une perspective micro-économique, en étudiant comment une meilleure performance des firmes dans le secteur informel peut promouvoir la prospérité partagée dans un contexte de fragilité. Ce chapitre montre que la performance des firmes est un facteur clé expliquant les différences de revenus entre les entrepreneurs. En outre, les résultats montrent que le capital humain et les compétences managériales sont des déterminants importants de la performance des firmes informelles.

**Mots-clés:** Croissance inclusive, Croissance pro-pauvre, , Inégalité, Pauvreté, Dépenses publiques, Composition des dépenses, Secteur informel, Performance des firmes.



*A mon cher père (Repose en paix),  
A ma mère*

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## TABLE OF CONTENTS

<b>General Introduction and Overview .....</b>	<b>1</b>
1.1. Context.....	2
1.2. Data issues and Stylized facts.....	3
1.2.1. Inequality.....	3
1.2.2. Poverty .....	19
1.3. Outline and main results.....	21
<b>The Quest for Pro-poor and Inclusive Growth: The Role of Governance.....</b>	<b>24</b>
2.1. Introduction.....	26
2.2. Literature Review .....	27
2.2.1. Growth, Poverty, and Income Distribution .....	27
2.2.2. Governance and Pro-poor Growth .....	28
2.3. Econometric Methodology .....	29
2.4. Data.....	30
2.4.1. Measuring Poverty and Inequality.....	30
2.4.2. Defining and Measuring Governance.....	31
2.4.3. Main explanatory variables .....	32
2.5. Pro-poor and Inclusive Growth: Empirical Evidence .....	34
2.5.1. Has growth been pro-poor and inclusive?.....	34
2.5.2. Pro-poor and inclusive growth: the role of governance .....	38
2.5.3. Other determinants of pro-poor and inclusive growth.....	41
2.6. Nonlinear and threshold estimations.....	45
2.6.1. Exogenous nonlinear estimation.....	45
2.6.2. Endogenous nonlinear estimation: Panel Smooth Transition Regression .....	47
2.7. Conclusion and discussion .....	54
Appendix A .....	56
<b>Reallocating Public Spending to Reduce Income Inequality: Can it work? .....</b>	<b>62</b>
3.1. Introduction.....	64
3.2. Data.....	66
3.2.1. Composition of public spending: A new dataset .....	66
3.2.2. Some Stylized Facts on Public Spending and Income Distribution .....	67
3.3. Econometric Analysis: Composition of Public Spending and Income Inequality .....	70
3.3.1. Estimated Model.....	70
3.3.2. Baseline Results.....	76
3.3.3. The Role of Conflict and Institutions .....	84
3.4. Further Robustness Checks .....	86
3.4.1. Long-Run Impact of Public Spending .....	86
3.4.2. Alternative indicators of inequality .....	87
3.4.3. Accounting for local government spending, the efficiency of public spending, and the use of debt to finance public outlays.....	88

3.5. Conclusion .....	90
Appendix B .....	91
<b>Informal Sector Heterogeneity and Income Inequality: Evidence from the Democratic Republic of Congo .....</b>	<b>111</b>
4.1. Introduction.....	113
4.2. Informal sector heterogeneity and inequality: Literature review .....	114
4.3. Data and descriptive statistics .....	117
4.3.1. 1-2-3 survey .....	117
4.3.2. Characteristics of the informal sector in DRC.....	118
4.4. Identification strategy: Informal firms.....	123
4.4.1. Defining a top performer .....	123
4.4.2. Sample selection bias.....	123
4.4.3. Identification of the constrained gazelles and survivalists.....	126
4.5. Heterogeneity in the informal sector .....	132
4.5.1. Individual entrepreneur characteristics.....	132
4.5.2. Firm typology and the choice of sector.....	134
4.5.3. Structural and behavioral factors.....	135
4.6. Urban poverty and income inequality in the informal sector.....	136
4.7. Drivers of the performance of informal firms .....	140
4.7.1. Explaining differences in income using Blinder-Oaxaca decomposition.....	140
4.7.2. Drivers of informal firms' performance.....	142
4.7.3. Explaining differences in performance using Blinder-Oaxaca decomposition..	145
4.8. Conclusion and Policy Recommendations .....	148
Appendix C .....	150
<b>General Conclusion .....</b>	<b>166</b>
<b>Résumé général .....</b>	<b>169</b>
<b>References.....</b>	<b>188</b>

## LIST OF TABLES

Table 1.1. Differences in PPP-adjusted GDP per capita estimates across WDI, PWT, and ICP ..	8
Table 1.2. Largest differences of PPP GDP per capita estimates between ICP and PWT .....	11
Table 1.3. Largest differences of PPP- GDP per capita estimates between WDI and PWT .....	11
Table 1.4. Largest differences of PPP GDP per capita estimates between WDI and ICP .....	12
Table 1.5. Correlations between Statistical capacity indicator and differences in real GDP per head across PWT, WDI and ICP .....	13
Table 1.6. Absolute differences of Nominal GDP estimates in percentage of PWT and ICP for the year 2011 .....	16
Table 1.7. Absolute differences of PPP estimates in percentage of PWT and ICP for the year 2011 .....	16
Table 1.8. Illustrative correlations of World Bank control of corruption with real GDP per head as reported in PWT, ICP and WDI for 2011 .....	17
Table 1.9. World and Regional Poverty Estimates .....	20
Table 2.1. Pro-poor growth regressions- income of the poorest 20 percent .....	35
Table 2.2. Pro-poor growth regressions- poverty headcount ratio at \$2 .....	36
Table 2.3. Governance and inclusive growth regressions .....	37
Table 2.4. Governance and pro-poor growth regressions .....	40
Table 2.5. Structural determinants of pro-poor growth .....	43
Table 2.6. Structural determinants of inclusive growth .....	44
Table 2.7. Pro-poor growth and governance: non-linearity .....	46
Table 2.8. Inclusive growth and governance: non-linearity .....	47
Table 2.9. Results of linearity for the PSTR models (i) and (ii) .....	51
Table 2.10. Parameter estimates for the PSTR model (i) .....	51
Table 2.11. Results of linearity for the PSTR models (iii) and (iv) .....	54
Table 3.1. Impact of Total Spending and Spending Components on Income Inequality .....	78
Table 3.2. Impact of Spending Components on Income Inequality – Financed by cut in Defense Spending .....	79
Table 3.3. Impact of Spending Components on Income Inequality – Financed by cut in Education Spending .....	80
Table 3.4. Impact of Spending Components on Income Inequality – Financed by cut in Health Spending .....	81
Table 3.5. Impact of Spending Components on Income Inequality – Financed by cut in Social Spending .....	82
Table 3.6. Impact of Spending Components on Income Inequality – Financed by cut in Infrastructure Spending .....	83
Table 4.1. Consumption Distribution across Informal Firms .....	120
Table 4.2. Determinants of Capital Ownership among Firms .....	124
Table 4.3. Step 2: Probability of being a Top Performer .....	126
Table 4.4. Percentage Share of Firms, by Province .....	128
Table 4.5. Percentage Share of Firms, within Province .....	131
Table 4.6. Comparison across Top Performers, Survivalists, and Constrained Gazelles .....	133

Table 4.7. Quintiles of Per Adult Equivalent Consumption, Informal Firms, % .....	136
Table 4.8. Poverty between Informal Firms, Logit Estimates .....	137
Table 4.9. Blinder-Oaxaca Decomposition of Per Adult Equivalent Income, Top Performers versus Constrained Gazelles.....	141
Table 4.10. Blinder-Oaxaca Decomposition of Per Adult Equivalent Income, Top Performers versus Survivalists .....	141
Table 4.11. Drivers of Performance.....	144
Table 4.12. Blinder-Oaxaca Decomposition of firms' performance, Top Performers versus Constrained gazelles .....	147
Table 4.13. Blinder-Oaxaca Decomposition of firms' performance, Top Performers versus Survivalists .....	147
<i>Appendix A</i>	
Table A1. Country list .....	56
Table A2. Description of variables.....	57
Table A3. Descriptive statistics of main variables.....	58
Table A4. Correlations between explanatory variables and lagged and differenced instruments used in the SYS-GMM estimation.....	58
Table A5. Governance indicators and pro-poor growth regressions.....	59
Table A6. Shared prosperity and structural variables .....	60
<i>Appendix B</i>	
Table B1. Summary Statistics .....	91
Table B2. Sample Country List.....	92
Table B3. Pairwise Correlation of Different Measures of Income Distribution .....	92
Table B4. Robustness Check: The role of institutions using median value .....	93
Table B5. Robustness Check: Long-term impact of spending (10-year framework).....	94
Table B6. Robustness Check: Long-term impact of spending (8-year framework).....	95
Table B7. Robustness Check: Long-term impact of spending (5-year framework).....	96
Table B8. Robustness Check: Change in Net Gini as the dependent variable .....	97
Table B9. Robustness Check: Market Gini.....	98
Table B10. Robustness Check: Gini from LIS.....	99
Table B11. Robustness Check: Top 10 percent income share.....	100
Table B12. Robustness Check: Bottom 10 percent income share.....	101
Table B13. Robustness Check: Ratio of Top to Bottom Decile Income Shares .....	102
Table B14. Robustness Check: Advanced vs. Developing Countries.....	103
Table B15. Robustness Check: Use of General Government Data .....	104
Table B16. Robustness Check: Controlling for the efficiency of capital spending.....	105
Table B17. Robustness Check: Controlling for debt financing of public outlays .....	106
<i>Appendix C</i>	
Table C1. Definition of the Variables.....	150
Table C2. Descriptive Statistics, Capital Distribution, by Sector and Province .....	153
Table C3. Descriptive Statistics, Capital Distribution, by Owner and Firm Characteristics .....	154
Table C4. Step 2: Probability of being a Top Performer, FILM .....	156



Table C5. Probability of being Top Performers, Constrained Gazelles, or Survivalists, Logit Model.....	157
Table C6. Income Inequality: Ordered Logit .....	158
Table C7. Income Inequality, Reclassification (1).....	159
Table C8. Income Inequality, Reclassification (2).....	160
Table C9. Income Inequality, Reclassification (3).....	161
Table C10. Income Inequality, Reclassification (4).....	162
Table C11. Drivers of Performance, Robustness Check .....	163

## LIST OF FIGURES

Figure 1.1. Evolution of Income Inequality and Top Income Share.....	5
Figure 1.2. GDP per capita relative to the US.....	6
Figure 1.3. PPP GDP per capita data comparison between WDI, PWT and ICP .....	10
Figure 1.4. Correlations between statistical capacity indicator and $\text{abs(WDI-PWT)}/\text{PWT}$ in %..	13
Figure 1.5. Correlations between statistical capacity indicator and $\text{abs(ICP-PWT)}/\text{PWT}$ in %...	14
Figure 1.6. Correlations between statistical capacity indicator and $\text{abs(WDI-ICP)}/\text{PWT}$ in %...	14
Figure 1.7. Health, Representative countries across regions, by Wealth Quintiles .....	18
Figure 1.8. Education, Representative countries across regions .....	18
Figure 1.9. Financial Services, by Income Share, Representative countries across regions .....	19
Figure 2.1. Growth and the income of the poor.....	35
Figure 2.2. Inclusive growth .....	37
Figure 2.3. Marginal impact of income growth on the income of the poor .....	52
Figure 2.4. Average estimated impact of income growth on the income of the poor.....	52
Figure 3.1. Composition of Spending: Functional classification.....	68
Figure 3.2. Progressive Taxation, Public Spending, and Income Inequality .....	69
Figure 4.1. Poverty Incidence among informal Entrepreneurs by province, 2012 (%).....	119
Figure 4.2. Top Performers, Constrained Gazelles, and Survivalists by Province, 2012 (%).....	128
Figure 4.3. Distributions across informal firms.....	131
Figure 4.4. Lorenz Curves by Informal Firms .....	137
<i>Appendix B</i>	
Figure B1. The Role of Conflict and Institutions: Change in Defense Spending.....	107
Figure B2. Social Protection Financed by cuts in Defense: The Role of Conflict and Institutions .....	108
Figure B3. Infrastructure Financed by cuts in Defense: The Role of Conflict and Institutions.	109
<i>Appendix C</i>	
Figure C1. Informal Businesses Started Because of Job Shortages in Large Firms.....	151
Figure C2. Size of Informal Firms (%) .....	151
Figure C3. Size of Informal Firms (%), by Gender .....	152
Figure C4. Location of Activities, Informal Firms .....	154
Figure C5. Infrastructure and Business Activity, Location by Gender (%) .....	155
Figure C6. Firm Location, by Quartile of Capital.....	155
Figure C7. Distribution of the Log of Value Added per Hours Worked.....	159
Figure C8. Changes in firms' performance of constrained gazelles and survivalists if they have the same characteristics as top performers (%) .....	164
Figure C9. Changes in firms' performance (%).....	164



# Chapter 1 General Introduction and Overview

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## **1.1. Context**

The world has witnessed a significant decline in extreme poverty since 1990. Mainly thanks to robust growth, the aggregate extreme poverty rate was reduced by more than two-third – from 35 percent in 1990 to 10.7 percent in 2013. This decline was mainly driven by the remarkable economic transformation in East Asia and Pacific, particularly in China and other emerging markets in East Asia. Extreme poverty rate in the region dropped from 61 percent in the 1990s to less than 4 percent in 2013. Extreme poverty also declined in South Asia, although is to a lower extent. Despite progress in poverty reduction globally, the number of extreme poor remains significant. The World Bank estimated that 768.5 million people lived with less than \$ 1.90 a day in 2013. More than a half of the extreme poor live in Sub-Saharan Africa.

Overall, growth has been pro-poor worldwide as it has reduced poverty. However, growth has been not inclusive as the poorest do not contribute to and benefit equally from economic growth. In contrast, those at the top of income distribution tend to capture the lion's share of benefits from economic growth.

The empirical literature suggests many factors that could help reduce poverty and income inequality. These factors include economic growth, institutions, technological progress, human capital, and international trade (Dollar and Kraay, 2002; Dollar, Kleineberg and Kraay, 2013; Kaufmann and Aart, 2002; Resnick and Regina, 2006; Woo et al., 2017). However, there is little evidence on policies that promote inclusive growth.

Alleviating poverty and achieving inclusive growth has been a long-standing objective of governments and development partners alike. These issues have been and remain at the forefront of the development policy debate around the world. This dissertation provides some evidenced-based policy lessons focusing on the role of institutional, structural, and fiscal policies in achieving pro-poor and inclusive growth. It has three main contributions. First, it assesses the nonlinear relationship between good governance, pro-poor and inclusive growth. Second, the literature examined the impacts of public spending on growth, poverty and inequality but did not consider the everlasting financing constraints most governments face. This dissertation provides a cross-country analysis investigating how a government can reduce income inequality by changing the composition of public spending while keeping the total level fixed. Third, this dissertation examines the role of structural policies in promoting shared prosperity in a fragile Sub-Saharan African country – the Democratic Republic of Congo, in a context of pervasive informal sector.

The following sections briefly present the main data issues and some stylized facts on inequality and poverty (section 1.2), as well as the outline and main results of this dissertation (section 1.3).

## **1.2. Data issues and Stylized facts**

### **1.2.1. Inequality**

When examining inequality, it is important to answer the question: inequality of what? There are many dimensions of inequality: inequality of outcomes – for instance inequality of individual earnings, family income, wealth, consumer spending, or individual economic well-being; and inequality of opportunities. As most studies, this dissertation focuses on inequality of income or consumption within countries, *which remains the level at which most policies operate*. Besides “within country” income inequality, it exists inequality between countries and global<sup>1</sup> inequality which represents a combination of the two former types of inequality.

*Measuring inequality is not easy or straightforward* (World Bank, 2016). Cross-country comparisons can be challenging, particularly when it comes to study income inequality within countries. First, the main source of inequality measures – household surveys covers either consumption or income expenditure. National statistical offices in industrialized countries and Latin America tend to compile statistics on household income while national statistical offices in South Asia, Sub-Saharan Africa (SSA), and the Middle East collect data on consumption expenditure. The World Bank (2016) underlines the fact that data understate the level of inequality in countries where consumption data are used. Second, data from household surveys are likely to underreport incomes (or consumption) at the top of the distribution. Other measurement challenges of inequality include data availability and survey comparability, significant differences in sampling unit used, as well as the definition of income (net or gross) or the time coverage of expenditure and income data.

The following subsections present some stylized facts on different dimensions of inequality and on poverty around the world.

---

<sup>1</sup> This dissertation will not expand on global inequality. See Bourguignon (2015) for more details.

### 1.2.1.1. *Inequality within countries*

The Gini coefficient is the most widely used measure of inequality within countries. It is derived from the Lorenz curve, which displays the cumulative share of the population versus the cumulative proportion of income (or expenditure). The Gini coefficient considers the entirety of distribution rather than just the extremes. Besides the World Bank Gini coefficient, it exists a number of Gini coefficients from different sources. First, the Gini index from the Luxembourg Income Study (LIS) is based solely on income surveys and its goal is to reach the highest level of harmonization. In addition, it does not include imputed data. However, the LIS database covers relatively few countries and years, mainly high and middle-income countries. The Gini coefficients after taxes and transfers or post-fiscal (net) and pre-fiscal (market) from the Standardized World Income Inequality Database (SWIID) were assembled by Frederik Solt using the LIS data as baseline. The SWIID Gini coefficients have the advantage to (i) maximize the comparability of data on income inequality and (ii) maintain the largest possible coverage across countries and over time. However, it also generates values using model-based imputation for the missing observations.

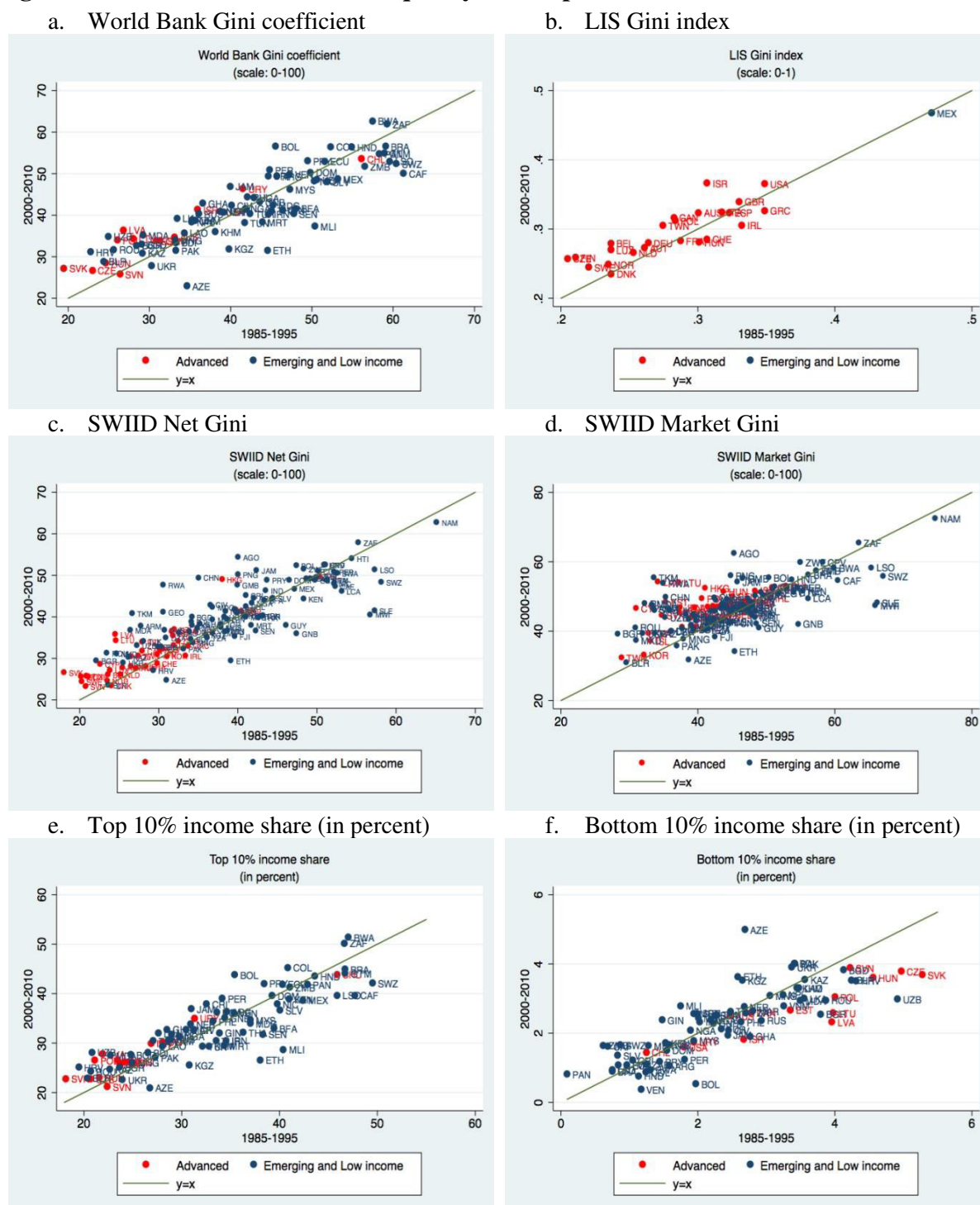
While the Gini coefficient is over-sensitive to changes in the middle of the distribution, it is less sensitive to changes at the top and bottom of the income distribution. The World Bank PovCalnet database provides detailed information on income distributions. It reports mean income and income shares by decile and quintile from national household surveys. Data on income shares have the advantage to capture income distribution at the tails.

Figure 1.1 shows the evolution of income inequality and top and bottom income shares across the world by income level. Data suggest that since the 1980s income inequality as measured by the World Bank Gini coefficient has increased in most advanced and many emerging and low-income countries (Figure 1.1a). Data on the LIS Gini index cover mainly advanced economies and show the same trend (Figure 1.1b). Disposable income (post-tax and post-transfer) inequality displays a similar upward trend (Figure 1.1c). However, there is a wider disparity across countries, mostly due to different degrees of progressivity in (income) tax systems and spending policies (Woo et al., 2017, Bastagli et al., 2012 among others). Pre-fiscal income inequality exhibits an upward trend for most advanced economies, but changes in market Gini estimates for many developing countries strikingly differ (Figure 1.1d).

Data suggest that the income share of the top decile in most advanced economies have increased between the period 1985-1995 and 2000-2010, with the exception of Slovenia. In

contrast, the bottom 10 percent income share has decreased in most advanced economies (Figure 1.1e and Figure 1.1f). In developing countries, changes in the income share of the top and bottom deciles vary across countries.

**Figure 1.1. Evolution of Income Inequality and Top Income Share**



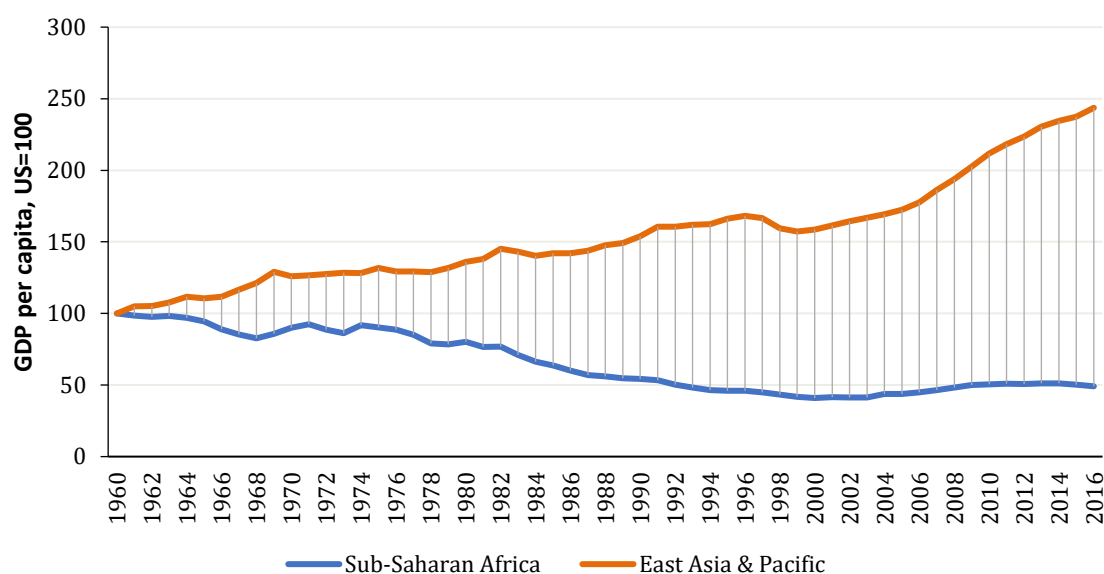


### 1.2.1.2. Inequality between countries

Remarkable economic transformation in parts of the world, especially in East Asia has led to global economic convergence. However, since the 1960s convergence with the United States has been reversed for the Sub-Saharan African region on average, despite substantial progress in some countries, especially this century (Figure 1.2). While Rwanda and Ethiopia have substantially improved their average incomes since 2000, even more than South Asia on average, the income gap with South Asia and East Asia has widened substantially for most Sub-Saharan African countries.

**Figure 1.2. GDP per capita relative to the US**

(Base 100, 1960, PPP constant 2011 international US dollars)



Source: Calculations using WDI, World Bank.

Assessing between-country inequality rests on properly measuring the wealth of Nations, which can be captured by Gross Domestic Product (GDP). However, GDP is subject to various issues since it is computed by different institutions, including the World Bank and the International Comparison Program (ICP). The ICP compiles detailed expenditure values of GDP for countries around the world. It also estimates purchasing power parities (PPP) exchange rate of countries around the world. The measurement uncertainty in purchasing power parity exchange rate is related to the fact that “*relative prices are much more dissimilar between Tajikistan and the US, or China or India and the US, than between Canada and the US.*” (Deaton, 2012). This raises questions regarding differences in PPP-adjusted GDP per

capita between three reference databases: ICP, World Development Indicators (WDI) and Penn World Table (PWT).

Following the release of the ICP round 2011 by the World Bank (2014, 2015) and the PWT version 9 that incorporates estimates of PPP from ICP round 2011, this section computes differences in PPP-adjusted GDP per capita estimates between the three reference databases: International Comparison Program (ICP) round 2011, World Development Indicators (WDI) version 2016, and Penn World Table (PWT) version 9. This section sheds some light on the sources of these differences.

The release of the ICP round 2011 by the World Bank (2014, 2015) in April 2014 led to surprising results (Dykstra, Kenny, and Sandefur, 2014). According to Deaton and Aten (2017): *“Until the publication of these results, the World Bank in its World Development Indicators provided extrapolated PPP exchange rates. For most countries, these were based on the 2005 round of the ICP, updated using relative inflation rates for each country. The new estimates for 2011 from ICP 2011 are quite different from these extrapolations. In particular, most poor countries of the world are estimated to be larger relative to the United States and other rich countries than was estimated from the extrapolations. This aspect of the results has attracted a good deal of attention, particularly the fact that the aggregate Chinese economy is much closer to the United States than previously estimated, and also that the Indian economy is now estimated to be larger than the Japanese economy. The new results also sharply reduce previous estimates of international inequality.”*

Deaton and Aten (2017) and Inklaar and Rao (2017) confirmed that the new measures of PPP prices of the ICP round 2011 are more accurate than the measures of the previous round 2005. They emphasize that regions were linked in ICP 2005. In both rounds of ICP, the methodology consists in collecting and comparing prices across countries within a region and then linking the regions (low-income, middle or high-income) to allow international price comparisons. This suggests that changes of prices of lower-income economies relative to higher-income countries are sensitive to changes of the linking approach.

Although impressive progress has been made in computing accurate PPP exchange rates from 2005 to 2011, this section shows that there is not much progress in harmonization among the three main data sources for the benchmark year 2011 with respect to the previous comparison done by Ram and Ural (2013) for the benchmark year 2005 using ICP round 2005, WDI and PWT. Yet, countries that present widely distinct estimates across ICP, WDI and PWT *differ* between 2011 (this dissertation) and 2005 (Ram and Ural 2013 paper).

### ***Countries with significant differences in PPP-adjusted GDP per capita between ICP, PWT and WDI***

Table 1.1 shows that between 9% (Columns 1 and 3) and 15% (Column 2) of countries have over 10% absolute differences in PPP-adjusted GDP per capita estimates between two databases. Between 24% and 40% of countries have over 5% absolute differences between two databases. Uzbekistan (UZB, 38%) and Comoros (COM, 57% and 52%) have the highest relative differences in PPP-adjusted GDP per capita estimates across the three databases.

**Table 1.1. Differences in PPP-adjusted GDP per capita estimates across WDI, PWT, and ICP**

(In percentage of PWT estimates, in absolute value, year 2011)

	(1)	(2)	(3)
Condition	abs(WDI-PWT) /PWT	abs(ICP-PWT) /PWT	abs(WDI-PWT) /PWT
Max	38% UZB	57% COM	52% COM
>10%	9%=16/176	15%=27/176	9%=15/168
>5%	24%=41/172	40%=70/176	29%=48/168

Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

While both versions of PWT 9.0 and WDI 2016 use the information of prices found in ICP 2011 as key input, their PPP-adjusted GDP per capita estimates *markedly differ* from those of ICP for several countries such as Mali. Some countries, for instance Iraq, have measures that differ markedly for each of the three databases. Conversely, other countries have very little differences in PPP-adjusted GDP per capita estimates between ICP and PWT and at the same time significant differences between ICP and WDI or vice versa. Conflict-affected countries, African countries, islands and oil-exporters are over-represented in countries showing large differences between the three data sources. On average, differences in PPP-adjusted GDP per capita estimates between WDI and PWT are smaller than differences between ICP and PWT, and between WDI and ICP.

Figure 1.3a illustrates these differences and Figure 1.3b zooms in on some selected countries around the center of Figure 1.3a. These figures include only countries for which the three measures are available. The vertical axis represents (WDI-PWT)/PWT. Countries close to the vertical axis have minor differences in PPP GDP per capita estimates between ICP and PWT. This is the case of Mali (MLI). Countries such as Comoros (COM) and Nigeria (NGA) that are very far from the vertical axis have significant differences between ICP and PWT. For

Comoros, estimates of PPP GDP per capita from WDI are 52% larger than PWT estimates. For Nigeria, estimates of PPP GDP per capita from WDI are 40% larger than PWT estimates.

Table 1.2 presents 20 countries for which estimates of PPP GDP per capita exhibit the largest differences. Comoros is the country having the largest difference in GDP per capita between ICP and PWT in percentage of PWT. For this country, GDP per capita estimates from ICP are 57% smaller than PWT relative to PWT while the percentage difference between WDI and PWT is only -5%. More than half of the 20 countries displaying the largest percentage differences in PPP GDP per capita between ICP and PWT are African and less developed countries. Yet, a few emerging countries such as Kuwait, Georgia and Ukraine also show significant disparities in PPP-adjusted GDP per capita between ICP and PWT.

The horizontal axis represents  $(ICP-PWT)/PWT$ . Countries close to the horizontal axis have small differences in PPP-adjusted GDP per capita estimates between WDI and PWT. This is the case of Comoros (COM) and Nigeria (NGA). For these two countries, PPP-adjusted GDP per capita estimates from WDI widely differ from ICP estimates while differences in PPP-adjusted GDP per capita estimates between PWT and ICP are very small. The first panel of Table 1.3 displays the top 10 countries for which PPP-adjusted GDP per capita estimates from WDI are larger than the ones from PWT. Out of these 10 countries, eight are African countries. For Mali, while WDI PPP-adjusted GDP per capita estimates are larger by about 25% than PWT estimates (relative to PWT), WDI estimates are about 24% larger than ICP estimates but the difference in PPP-adjusted GDP per capita between ICP and PWT is only 1%. This suggests that for this country, corrections made in PWT relative to ICP are minor compared to adjustments made in WDI relative to PWT. The second panel shows countries for which PPP-adjusted GDP per capita estimates from PWT are larger than the ones from ICP. In addition to African countries, some European and Central Asian countries such as Uzbekistan, Turkmenistan, Ukraine and Kyrgyz Republic show significant differences. For instance, PPP-adjusted GDP per capita estimates for Uzbekistan are 38% smaller in WDI than in PWT (in percentage of PWT). However, for countries such as Swaziland (0%), Nigeria (1%) and Liberia (1%) the gaps between WDI and PWT are negligible.

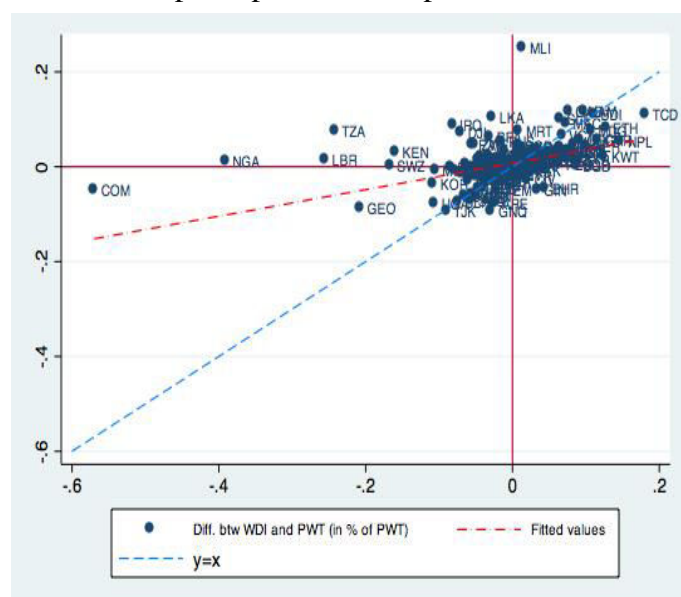
The deviation with respect to the line  $y=x$  represents  $y-x=(WDI-ICP)/PWT$ . Countries on the line  $y=x$  are such that estimates of PPP-adjusted GDP per capita in WDI and ICP are identical. This is the case of Tajikistan (TJK) in Figure 1.3b. WDI PPP-adjusted GDP per capita estimates differ from ICP estimates for countries such as Mali (close to the vertical axis) and Comoros (close to the horizontal axis) – that are far from the line  $y=x$ . Table 1.4 presents 20 countries

for which estimates of PPP-adjusted GDP per capita in WDI and ICP show the largest differences. 12 African countries are listed in this table. The estimates of PPP-adjusted GDP per capita for Comoros, Nigeria and Tanzania are sizably larger in WDI than in ICP (relative to PWT). For countries such as Chad, Qatar, Bahrain, Nepal, Angola, Kuwait ICP estimates are larger (from 7% to 10%) than WDI estimates.

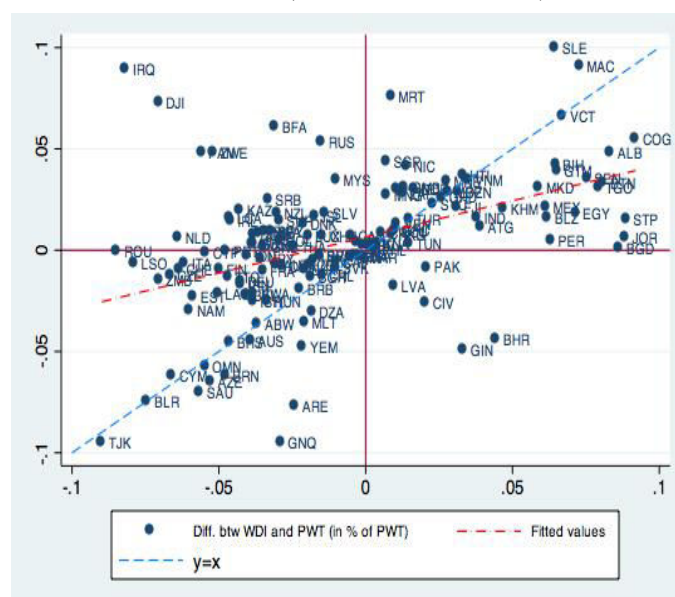
In Figure 1.3b, Iraq is far from the vertical and horizontal axes as well from the line  $y=x$ . This means that for this country, the three measures of WDI, PWT and ICP are markedly different. Finally, several countries such as the United States, at the center of the graph have similar measures for the three databases WDI, PWT and ICP.

**Figure 1.3. PPP GDP per capita data comparison between WDI, PWT and ICP**

a. PPP GDP per capita data comparison



b. Selected countries (zoom on the center)



Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

Note: Y-axis presents  $(WDI-PWT)/PWT$  and  $(ICP-PWT)/PWT$  is shown on X-axis. The deviation with respect to line  $y=x$  represents  $(WDI-ICP)/PWT$ .

**Table 1.2. Largest differences of PPP GDP per capita estimates between ICP and PWT**  
(Percentage of PWT, year 2011)

	(ICP-PWT) /PWT	(WDI-PWT) /PWT	(WDI-ICP) /PWT	WDI	PWT	ICP
Countries for which ICP is larger than PWT:						
Chad	18%	11%	-7%	1862	1679	1984
Nepal	15%	5%	-9%	2042	1936	2222
Ethiopia	13%	8%	-5%	1165	1077	1214
Kuwait	13%	2%	-10%	76309	74705	84058
Cameroon	12%	6%	-6%	2615	2472	2757
Burundi	11%	11%	0%	713	641	712
Madagascar	11%	8%	-3%	1372	1275	1412
Niger	10%	4%	-6%	807	774	852
Jamaica	10%	12%	2%	8481	7588	8329
Congo Rep.	9%	5%	-4%	5632	5339	5830
Countries for which ICP is smaller than PWT:						
Comoros	-57%	-5%	52%	1348	1417	610
Nigeria	-39%	1%	40%	5231	5169	3146
Liberia	-26%	1%	27%	733	722	537
Tanzania	-24%	8%	32%	2207	2052	1554
Georgia	-21%	-9%	12%	7315	8006	6343
Myanmar	-18%	-	-	-	3864	3181
Ukraine	-17%	-17%	0%	8282	10029	8295
Swaziland	-17%	0%	17%	7620	7598	6328
Kenya	-16%	3%	19%	2623	2543	2136
Armenia	-15%	-14%	1%	6803	7876	6696

Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

**Table 1.3. Largest differences of PPP- GDP per capita estimates between WDI and PWT**  
(Percentage of PWT, year 2011)

	(WDI-PWT) /PWT	(ICP-PWT) /PWT	(WDI-ICP) /PWT	WDI	PWT	ICP
Countries for which WDI is larger than I						
Mali	25%	1%	24%	1863	1489	1509
Jamaica	12%	10%	2%	8481	7588	8329
Gabon	12%	8%	4%	17101	15321	16483
Burundi	11%	11%	0%	713	641	712
Chad	11%	18%	-7%	1862	1679	1984
Sri Lanka	10%	-3%	13%	9214	8342	8111
Sierra Leone	10%	6%	4%	1415	1286	1369
Macao SAR,	9%	7%	2%	117341	107600	115441
Iraq	9%	-8%	17%	13203	12121	11130
Ethiopia	8%	13%	-5%	1165	1077	1214
Countries for which WDI is smaller than I						
Uzbekistan	-38%	-	-	4412	7072	-
Turkmenistan	-31%	-	-	11361	16370	-
Ukraine	-17%	-17%	0%	8282	10029	8295
Maldives	-16%	-14%	-2%	11127	13201	11392
Kyrgyz Repu	-15%	-11%	-4%	2921	3437	3062
Qatar	-15%	-7%	-8%	134117	156909	146521
Armenia	-14%	-15%	1%	6803	7876	6696
Angola	-13%	-3%	-10%	6524	7528	7288
Congo, Dem.	-11%	-5%	-5%	617	691	655
Bermuda	-10%	-10%	0%	54985	61338	54899

Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

**Table 1.4. Largest differences of PPP GDP per capita estimates between WDI and ICP**  
(Percentage of PWT, year 2011)

	(WDI-ICP) /PWT	(WDI-PWT) /PWT	(ICP-PWT) /PWT	WDI	PWT	ICP
Countries for which WDI is larger than ICP						
Comoros	52%	-5%	-57%	1348	1417	610
Nigeria	40%	1%	-39%	5231	5169	3146
Tanzania	32%	8%	-24%	2207	2052	1554
Liberia	27%	1%	-26%	733	722	537
Mali	24%	25%	1%	1863	1489	1509
Kenya	19%	3%	-16%	2623	2543	2136
Iraq	17%	9%	-8%	13203	12121	11130
Swaziland	17%	0%	-17%	7620	7598	6328
Djibouti	14%	7%	-7%	2783	2595	2412
Sri Lanka	13%	10%	-3%	9214	8342	8111
Countries for which WDI is smaller than ICP						
Kuwait	-10%	2%	13%	76309	74705	84058
Angola	-10%	-13%	-3%	6524	7528	7288
Nepal	-9%	5%	15%	2042	1936	2222
Bahrain	-9%	-4%	4%	39677	41517	43361
Bangladesh	-9%	0%	9%	2579	2578	2800
Guinea	-8%	-5%	3%	1184	1245	1287
Jordan	-8%	1%	9%	10324	10262	11169
Qatar	-8%	-15%	-7%	134117	156909	146521
Sao Tome and Principe	-7%	2%	9%	2840	2797	3045
Chad	-7%	11%	18%	1862	1679	1984

Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

### ***Understanding differences in PPP-adjusted GDP per capita between ICP, PWT and WDI***

As GDP per capita is one of the most widely used measures of a country's standard of living, understanding differences between these three sources is an important matter for researchers and policy makers. For example, Ciccone and Jarociński (2010) and Johnson et al. (2013) highlighted that the variability of vintages of PWT impacts on results of growth studies.

One of the causes of the problem may be weak statistical capacity in these countries to collect data (Devarajan, 2013). This dissertation finds correlation coefficients that are rather weak, below 0.1 in absolute value and are not significant. Differences in PPP-adjusted GDP per capita across databases do not seem to be related to the weak statistical capacity of source countries (Table 1.5).

Figure 1.4, Figure 1.5 and Figure 1.6 present correlations between the absolute differences in real GDP per capita across WDI, ICP and PWT (relative to PWT) and the statistical capacity indicator. These figures are zoomed in on countries for which the percentage differences in absolute value are below 20%. Correlations are not significant. However, one observes that some countries (Ukraine, Armenia) with higher levels of statistical capacity indicator report

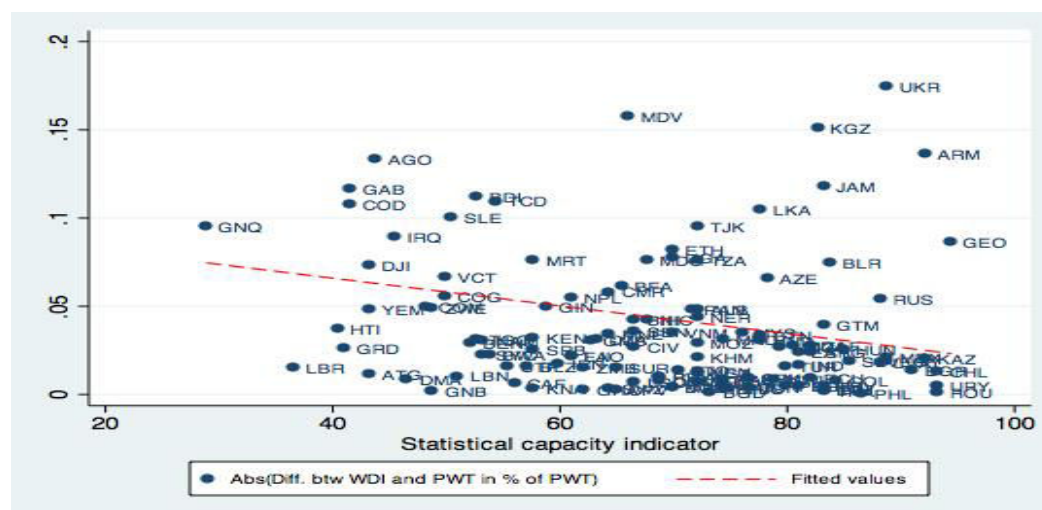
larger measurement errors in PPP-adjusted GDP per capita between WDI and PWT, and between ICP and PWT (relative to PWT) but a slighter difference between WDI and ICP (0.1% for Ukraine and 1% for Armenia).

**Table 1.5. Correlations between Statistical capacity indicator and differences in real GDP per head across PWT, WDI and ICP**

	Statistical Capacity indicator	(WDI-PWT)/PWT	(ICP-PWT)/PWT
(WDI-PWT)/PWT	-0.039		
(ICP-PWT)/PWT	0.003	0.439***	
(WDI-ICP)/PWT	-0.081	0.215***	-0.783***

Note: Significance level:\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

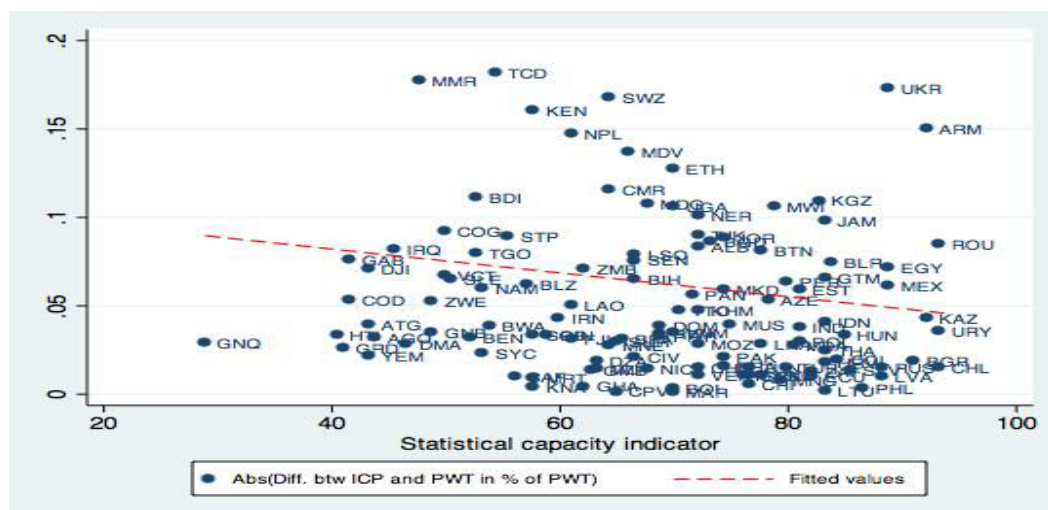
**Figure 1.4. Correlations between statistical capacity indicator and abs(WDI-PWT)/PWT in %**



Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

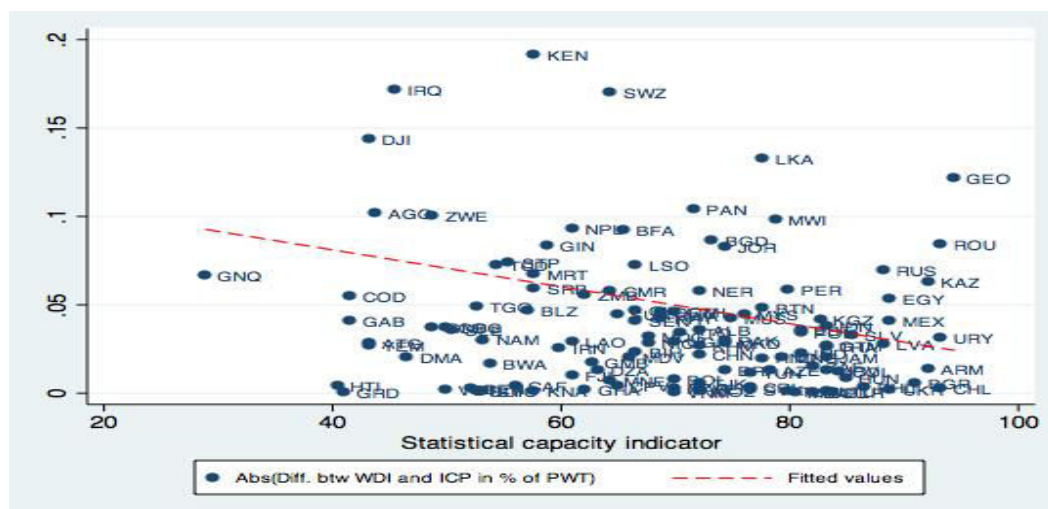


**Figure 1.5. Correlations between statistical capacity indicator and  $\text{abs(ICP-PWT)/PWT}$  in %**



Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

**Figure 1.6. Correlations between statistical capacity indicator and  $\text{abs(WDI-ICP)/PWT}$  in %**



Source: Calculations using WDI 2016, PWT 9.0 and ICP round 2011.

Major differences in PPP-adjusted GDP estimates may be due to differences in nominal GDP and/or Purchasing Power Parity (PPP) estimates as different agencies use diverse sources of data and different methodologies. For instance, while the World Bank estimates GDP by collecting data from National Statistics Institutes, national accounts and the Organization for Economic Co-operation and Development – OECD’s national accounts data files, PWT relies mainly on data on GDP at current and constant prices, in local currency units from National Accounts. The main source of the National Accounts’ data is the United Nation Main

Aggregates Databases. In addition, different countries rely on different definitions, methods and reporting standards in estimating GDP.

Differences between the three databases in GDP at local currency can be a result of national accounts revisions. Table 1.6 reports absolute differences of nominal GDP estimates across the three databases respectively in percentage of PWT and ICP. For 3% (difference between ICP and PWT) to 75% (difference between WDI and PWT) of countries, percentage differences are higher than 50 percent.

Another cause of significant differences in PPP-adjusted GDP per capita between WDI version 2016, PWT 9.0 and ICP round 2011 may be the different aggregation methods used to compute the Parity Purchase Power (PPP). According to Feenstra, Inklaar and Timmer (2015), low-income countries with lower relative prices of nontraded goods will seem poorer if their expenditures are simply converted at the nominal exchange rate. For example, in 2011 nominal GDP per capita of Cambodia was 1.9% of that of the United States while its real (PPP-adjusted) GDP per capita was 5.9% of that the United States in 2011. To get an estimate of real GDP, PWT statistical agencies rely on an econometrically estimated expenditure function while ICP statistical agencies prefer index-number methods<sup>2</sup>.

Table 1.7 summarizes absolute differences of PPP estimates between ICP and PWT respectively in percentage of PWT and ICP for the year 2011. 22% of countries have a difference in absolute value of at least 10 percent while three to four percent of countries have more than 50 percent in terms of percentage differences of PPP estimates between ICP and PWT. Countries registering the largest percentage differences include Zambia, Cayman Islands and Kyrgyzstan.

Differences in PPP-adjusted GDP per capita may also be due to discrepancies across databases in population estimates. Devarajan (2013) states that in many countries GDP accounts use old methods and population censuses are out of date.

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<sup>2</sup> For more details on methods used to compute PPPs by PWT see Feenstra, Inklaar and Timmer (2015), for methods used by ICP see [http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/01\\_ICPBook\\_Framework\\_NEW.pdf](http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/01_ICPBook_Framework_NEW.pdf)

**Table 1.6. Absolute differences of Nominal GDP estimates in percentage of PWT and ICP for the year 2011**

Condition	abs[(WDI-PWT) /PWT]_NGDP	abs[(ICP-PWT) /PWT]_NGDP	abs[(WDI-ICP) /PWT]_NGDP	abs[(WDI-PWT) /ICP]_NGDP	abs[(ICP-PWT) /ICP]_NGDP	abs[(WDI-ICP) /ICP]_NGDP
Max	266% KWT	8226% ZMB	8274% ZMB	255% KWT	199% CYM	248% KWT
>50%	75%=129/173	3%=6/175	73%=122/168	73%=123/168	5%=9/175	74%=125/168
>90%	24%=41/172	40%=70/176	29%=48/168	48%=80/168	2%=4/175	51%=85/168

Source: Authors' calculation using WDI 2016, PWT 9.0 and ICP round 2011.

Note: Nominal GDP estimates (NGDP) for PWT were estimated using the PPP and real GDP (CGDPE).

**Table 1.7. Absolute differences of PPP estimates in percentage of PWT and ICP for the year 2011**

Condition	abs[(ICP-PWT) /PWT]_PPP	abs[(ICP-PWT) /ICP]_PPP
Max	94673% ZMB	180% CYM
>50%	3%=5/175	4%=7/175
>10%	22%=38/175	22%=39/175

Source: Authors' calculations.

Note: PPP estimates were inferred using price level of CGDPO

( $pl\_gdpo = PPP/XR$ ), price level of USA output-side real GDP

GDPO in 2011=1 and exchange rate (XR).

Since differences in PPP-adjusted GDP per capita are significant between the three sources especially for some countries, conclusions of research may vary according to which estimates and which sample of countries are used. Table 1.8 reports simple correlations of the World Bank control of corruption index with real (PPP-adjusted) GDP per capita across PWT 9.0, ICP round 2011 and WDI version 2016. Differences in correlations are more pronounced for countries with the largest percentage differences in real GDP per capita between the three sources and low and low-middle income countries than the average country (all the sample). For instance, results show that control of corruption is positively and significantly associated with development in countries with the largest differences in the three GDP estimates when using the ICP real GDP per capita. However, this result does not hold anymore when the real GDP estimates from WDI and PWT are used.

While undertaking international comparison studies, it is important for researchers and policy makers to exercise caution when forming critical recommendations as differences in data sources can impact results.

**Table 1.8. Illustrative correlations of World Bank control of corruption with real GDP per head as reported in PWT, ICP and WDI for 2011**

	PWT	ICP	WDI
All sample	0.8231***	0.8320***	0.8286***
Countries with largest differences in %	0.1527	0.5348**	0.285
Low and low-middle income countries	0.2833*	0.3074**	0.3121**

Note: Significance level:\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Countries with largest differences are those countries reported in Tables 1.3, 1.4 and 1.5.

Source: Author's calculations using WDI 2016, PWT 9.0, ICP round 2011 and World Bank Gini index.

### 1.2.1.3. Inequality of opportunities

In addition to income inequality, most countries around the world face significant inequality of opportunities. Inequality in outcomes and inequality of opportunities are strongly associated (Lefranc, Pistolesi and Trannoy, 2008 among others). This subsection discusses the evolution of various aspects of inequality of opportunities, including access to education, health and financial services, in different parts of the world.

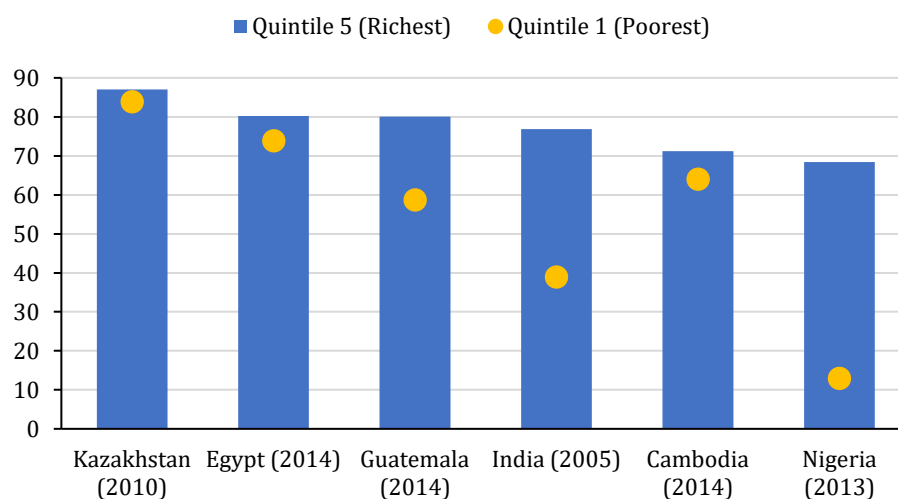
**Health.** There is a significant gap between the wealthiest and the poorest in terms of access to healthcare, particularly in developing economies. Figure 1.7 displays the coverage of reproductive, maternal, newborn, and child health interventions by income shares. It shows that there is a major difference in health coverage between rich and poor people, particularly in Sub-Saharan Africa. In Nigeria, 68.4 percent of the richest 20 percent have access to these health interventions as compared to only 13 percent for the poorest quintile of income distribution.

**Education.** There are large disparities in access to education between the richest and poorest 20 percent. As presented in Figure 1.8, the average years of education for individuals aged between 20 and 24 are much higher for the richest quintile than for the poorest quintile. The gap is larger in Nigeria where the average years of schooling for the 20-24 years old are 12 for the top quintile and below 2 for the bottom quintile. Such a gap is smaller in Kazakhstan.

**Financial services.** Access to finance is important for households, particularly low-income individuals. Households, especially poor ones may need credit to afford appropriate health services, adequate education and nutrition. The lack of adequate financial services can thus generate income inequality. There are some disparities in access to financial services across the income distribution. The share of adults in the top 60 percent of the income distribution

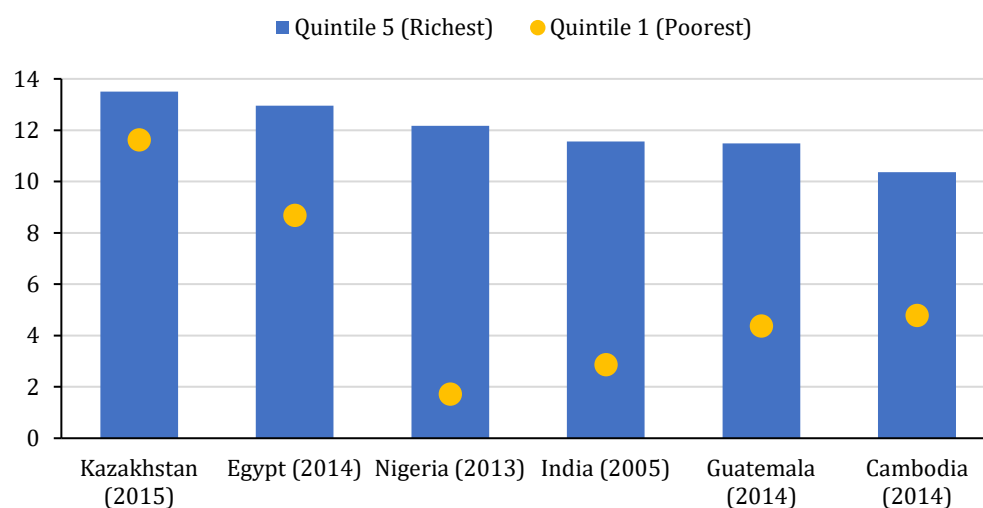
with a bank account is higher as compared to the share for adults in the bottom 40 percent in the income distribution (Figure 1.9). At the global level, 66 percent of adults in the top 60 percent of income distribution have accounts at a financial institution as compared with 53.3 percent of adults in the bottom 40 percent of the income distribution. The gap is wider in Sub-Saharan Africa than in other regions.

**Figure 1.7. Health, Representative countries across regions, by Wealth Quintiles**  
(Reproductive, maternal, newborn and child health interventions, combined, in percent)



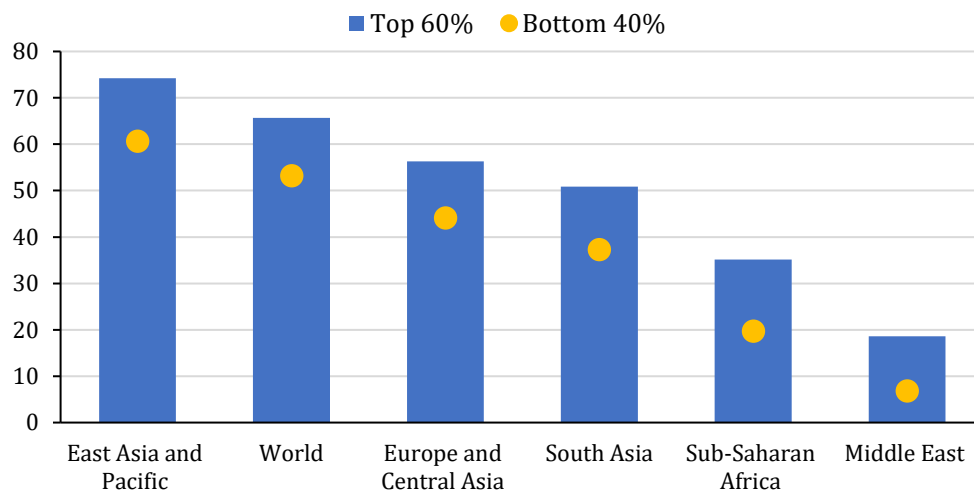
Source: World Health Organization, Health Equity Monitor database

**Figure 1.8. Education, Representative countries across regions**



Source: World Inequality Database on Education (WIDE).

**Figure 1.9. Financial Services, by Income Share, Representative countries across regions**  
(Accounts at a financial institution, percent of total 15+ population, 2014)



Source: Global Findex database, World Bank

Note: Developing region only.

### 1.2.2. Poverty

International comparisons of poverty data entail many issues. First, poverty measurements require household survey data for frequent measures of income or consumption and its distribution across households. However, household surveys are not conducted on each year. Therefore, one needs additional data to produce a reliable length of time for poverty data. Second, sampling weights, which ensure the survey is nationally representative are needed to produce poverty estimates. However, census data, which are required to produce sampling weights are often of low quality or outdated. Third, population data are also required to produce poverty rates and poverty counts. Typically, population censuses are conducted every 10 years (World Bank, 2015). In addition, to estimate the number of extreme poor in the world it is essential to rely on a poverty line that is comparable across countries. Purchasing Power Parity (PPP) index numbers from the International Comparison Program (ICP) are used to adjust differences in the cost of living across different countries. It is worth noting that poverty estimates tend to be sensitive to changes in the PPP data (World Bank, 2015).

Table 1.9 (upper panel) below presents the number of people living on less than \$1.25 per day by region. One observes that across the world, the poverty headcount at \$1.25 declined from 1990 to 2008, but it remains high essentially in Sub-Saharan Africa and South Asia. Table 1.9 (lower panel) shows the evolution of poverty worldwide and by region. Extreme poverty

declined worldwide over the last two decades particularly in East Asia and Pacific where poverty rates dropped from more than 60 percent in 1990 to less than 4 percent in 2013. The other regions except Europe and Central Asia also experienced reductions in poverty but to a lesser extent. Even with these recorded progress, the number of extreme poor was estimated at 768.51 million in 2013. More than a half of extreme poor lived in Sub-Saharan Africa in 2013.

**Table 1.9. World and Regional Poverty Estimates**

	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	World
<i>Number of Poor (millions), \$1.9/ day</i>							
1990	983.59	8.08	70.33	14.2	505.74	278.06	1,864.60
2002	553.74	29.3	69.83	9.46	556.01	396.31	1,619.74
2010	221.19	13.7	37.58	7.99	400.6	400.54	1,087.65
2013	73.86	10.41	30.09	8.27	249.09	390.26	768.51
<i>Poverty Headcount at \$1.9/ day (percent)</i>							
1990	61.38	1.74	15.96	6.18	44.64	54.37	35.28
2002	29.98	6.24	13.06	3.23	38.68	56.14	25.81
2010	11.26	2.88	6.35	2.36	24.57	45.67	15.69
2013	3.68	2.16	4.91	2.31	14.66	40.98	10.7

Source: PovCalnet, World Bank

### **1.3. Outline and main results**

This dissertation provides some evidence-based policy lessons in alleviating poverty and attaining pro-poor and inclusive growth. It comprises three main chapters, in addition to the overview chapter. The second chapter examines the role of institutions in promoting pro-poor and inclusive growth at the macroeconomic level. Using a novel empirical model, it assesses the nonlinear relationship between good governance, pro-poor and inclusive growth. The findings show that growth has been pro-poor – that is, it has reduced poverty. However, growth has been not inclusive, as it did not significantly impact the growth of the income share held by the poorest 20 percent. All features of good governance are pro-poor but only government effectiveness and rule of law promote inclusive growth. While the impact of growth on the income of the poor is nonlinear and increases with the control of corruption, the relationship between government effectiveness and inclusive growth is linear. Education spending, infrastructure improvement, and financial development are key factors for promoting poverty reduction and inclusive growth.

Can a government reduce income inequality by changing the composition of public spending while keeping the total level fixed? This question is of particular relevance given the everlasting financing constraint most governments face, either because of already high public spending, elevated public debt, limited domestic resources, or the combination of the three. The third chapter examines the effects of public spending reallocation on income inequality. Using a newly assembled data on disaggregated public spending for 83 countries across all income groups, it shows that reallocating spending towards social protection and infrastructure is associated with reduced income inequality, particularly when it is financed through cuts in defense spending. However, the political and security situation matters. We do not find evidence that lowering defense spending to finance infrastructure and social outlays improves income distribution in countries with weak institutions and at higher risk of conflict. Reallocating social protection and infrastructure spending towards other type of spending tend to increase income inequality. Accounting for the long-term impact of health spending, and particularly education spending, help to better capture their equalizing effects.

The fourth chapter uses 1-2-3 survey data on the Democratic Republic of Congo to analyze heterogeneity in the informal sector. It empirically identifies three types of entrepreneurs in the sector. The first group of entrepreneurs—top performers—is growth oriented and enjoys greater access to capital. The second group—constrained gazelles—includes entrepreneurs who share many characteristics, especially management skills, with the top performers, but



operate with less capital. The third group—survivalists—comprises firms struggling to grow. Based on logit and fixed effect ordinary least squares models, the results presented in this chapter show that poverty and income inequality are more common among constrained gazelles and survivalists. The chapter also shows that income inequality is explained mainly by educational disparities and lack of credit access among entrepreneurs. Additionally, the outcomes of a Blinder-Oaxaca decomposition show that the performance of firms is a key factor in explaining differences in income. Examining the drivers of performance, the chapter finds that human capital and managerial skills are important engines of performance.



# Chapter 2 The Quest for Pro-poor and Inclusive Growth: The Role of Governance

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**Abstract:** This chapter analyses the role of good governance in fostering pro-poor and inclusive growth. Using a sample of 112 countries over 1975–2012, it shows that growth is generally pro-poor. However, growth has not been inclusive, as illustrated by a decline in the bottom 20 percent of the income distribution. While all features of good governance support income growth and reduce poverty, only government effectiveness and the rule of law are found to enhance inclusive growth. The investigation of the determinants of pro-poor and inclusive growth highlights that education, infrastructure improvement, and financial development are the key factors in poverty reduction and inclusive growth. Relying on the panel smooth transition regression (PSTR) model following Gonzalez, Tersvirta and Dijk (2005), this chapter identifies a nonlinear relationship between governance and pro-poor growth, while the impact of governance on inclusive growth appears to be linear.

## **2.1. Introduction**

Poverty remains widespread, particularly in developing countries, notwithstanding recent progress. While the aggregate worldwide poverty rate was reduced by about half between 1990 and 2010 mainly thanks to robust growth, the World Bank estimated that more than 1.22 billion people lived with less than \$1.25 a day in 2010. To contrast the encouraging dynamic in poverty reduction, income inequality has risen across the world over the last two decades. How do these two divergent dynamics impact the income opportunities of the less fortunate, namely the poorest 20 percent of the population? This is an important policy question that has led to the development of new concepts for pro-poor growth and increased focus on income distribution with new studies on inclusive growth.

Numerous empirical and statistical studies have identified economic growth as one of the main factors affecting poverty reduction (Dollar and Kraay, 2002; Dollar, Kleineberg and Kraay, 2013). Moreover, there is a growing understanding that economic, political, legal and social institutions are critical for economic prosperity. Since the 1990s the concept of “good governance” has become central in the discussion and design of development policies. Since both governance and pro-poor growth are important in development policies agenda, the question arises as to whether and how they are related to each other.

This chapter provides a cross-country analysis investigating the role of economic growth in poverty reduction and adds two main contributions to the existing literature. First, it contributes to the recent and growing literature on inclusive growth by assessing how pro-poor and inclusive growth has been. It also investigates the main structural factors that impact inclusive growth with a particular attention to an important channel that has received little attention so far: the quality of governance. Second, focusing on governance, the chapter investigates the potential non-linearities in the impact of growth on the poor depending on the quality of governance.

The analysis therefore sheds some light on the role of governance in making growth more pro-poor and inclusive. Following Ravallion and Chen (2003), this chapter defines growth as pro-poor simply if it reduces poverty or increases the income of the poor while inclusive growth refers to growth which is not associated with an increase in inequality (Rauniyar and Kanbur, 2010).

The chapter relies on panel fixed effect estimations and the Generalized Method of Moments in System (SYS-GMM) following Arrellano and Bover (1995). This method attempts to

address endogeneity issues related to potentially endogenous explanatory variables. A second empirical method used in the study is the Panel Smooth Transition Regression (PSTR), following Gonzalez, Tervirta and Dijk (2005). The PSTR models a non-linear relationship and captures the speed of transition from one regime to the other, with the transition between the two regimes assumed to be gradual.

The main findings are that (i) in general growth is pro-poor: the income of the poorest 20 percent increases with per capita income growth; (ii) globally growth has not been inclusive; (iii) all features of good governance especially control of corruption are pro-poor but only two features – government effectiveness and rule of law promote inclusive growth; (iv) the impact of growth on the income of the poor is non-linear and declines with the level of corruption. However, the impact of growth on the income share of the poorest 20 percent is linear; and (v) structural factors such as education spending, infrastructure improvement, and financial development are key factors for promoting both poverty reduction and inclusive growth.

The rest of the chapter is structured as follows. Section 2.2 briefly reviews the literature on pro-poor growth and income distribution as well as the relationship between governance and pro-poor growth. Section 2.3 explains the econometric methodology. Section 2.4 describes the data and sections 2.5 and 2.6 present empirical results. Section 2.7 provides concluding remarks.

## **2.2. Literature Review**

### **2.2.1. Growth, Poverty, and Income Distribution**

This section discusses the cross-country empirical literature analyzing the relationship between growth, poverty and income distribution.

In his seminal paper, Kuznets (1955) found evidence of an inverted-U relationship between the level of development and income inequality. As economies develop, inequality increases initially because growth tends to benefit a small segment of the population. Overtime, inequality declines subsequently as a larger part of the population finds employment in the high-income sector. However, existing empirical evidence of the Kuznets curve is at best mixed. Deininger and Squire (1998) found no evidence of an inverted-U relationship between per capita income and inequality. The authors show that high growth was associated with declining inequality as often as it was related to increasing inequality, or no changes at all. Ravallion and Chen (1997) highlighted that changes in inequality and polarization were uncorrelated using household surveys for 67 developing and transnational economies over the

period 1981-1994. The authors showed that income distribution improved as often as it worsened in growing economies, and negative growth was often more unfavorable to distribution than positive growth. Goudie and Ladd (1999) also found little evidence that growth systematically changes income distribution.

Empirical evidence on the reverse link, which is the impact of inequality on growth, is similarly mixed. For instance, Forbes (2000) showed that an increase in income inequality has a significant positive effect on economic growth in short and medium term. Alesina and Rodrik (1994) illustrated in a political economy context that when inequality is high, the poor have less voice and accountability. In such a context, the median voter will push for distortionary taxes, which will have discouraging effects on savings and hamper growth. Berg and Ostry (2011) found that lower income inequality is associated with sustained growth spells.

Few other studies have analyzed the impact of inequality on poverty. Deininger and Squire (1998) examined how initial inequality and concomitant changes in inequality impact poverty. They found that the poorest 20 percent suffer the most from growth decreasing effects of inequality. Initial inequality also hurts the poor via credit rationing and powerlessness to invest. Ravallion (2001) also shows that the poor might gain more from redistribution but suffer more than the rich from economic shrinkage.

### **2.2.2. Governance and Pro-poor Growth**

A large number of studies have investigated the role of good governance for economic development and poverty reduction. Kaufmann and Aart (2002) identified a strong positive correlation between per capita income and the quality of governance across countries. The authors also highlighted a strong positive causal effect running from better governance to higher per capita income. However, they found a weak, even negative, causal effect running from per capita income to governance, not supporting a possible “virtuous circle”, in which higher income leads to further improvement in governance.

Dollar and Kraay (2002) found that a greater rule of law is associated with a larger share of growth dividend accruing to the poorest 20 percent of the population. Kraay (2004) found similar results. Resnick and Regina (2006) developed a conceptual framework specifying the relationship between different aspects of governance and pro-poor growth. Using this framework, the paper reviewed a range of quantitative cross-country studies analyzing pro-poor growth and including indicators of governance as independent variables. The review indicated that governance indicators, such as political stability and rule of law are associated

with higher growth but provided mixed results regarding poverty reduction. However, governance indicators related to transparency, such as civil liberties and political freedom, tend to conduce to poverty reduction but the evidence is rather mixed when it comes to the relationship between these variables and growth. Providing a different perspective, Lopez (2004) assessed whether policies that are pro-growth are also pro-poor. He found that policies tend to be poverty reducing in the long run rather than the short run. The author also argues that political economy constraints could prevent these policies from staying in place long enough to be able to reduce poverty. Kraay (2004) found that better rule of law and enhanced accountability are both positively correlated with higher growth. White and Anderson (2001) argued that civil liberties and political freedom are pro-poor, with political freedom having a much larger impact.

### **2.3. Econometric Methodology**

This section describes the main empirical framework underlying our analysis. The analysis covers 112 developed and developing countries.<sup>3</sup> Following various empirical studies on economic growth, the chapter relies on 10 non-overlapping 4-year periods to control for business cycle fluctuations during the sample period (1975-2012).<sup>4</sup>

The following equation forms the basis of our empirical strategy:

$$\ln Y_{it} = \beta \ln GDPpc_{it} + \gamma \ln GINI_{it} + \beta_{Gov} Gov_{it} + \beta_X X_{it} + \alpha_i + \mu_t + \varepsilon_{it} \quad (2.1)$$

where  $Y_{it}$  is a vector of our three distinct dependent variables capturing poverty and inclusiveness for each country  $i$  during period  $t$ : (i) the income of the poorest 20 percent in the income distribution ( $yp_{it}$ ); (ii) the poverty headcount ratio at \$2 a day PPP ( $P_{it}$ ); and (iii) the income share of the poorest 20 percent ( $Q_{it}$ ).  $\ln GDPpc_{it}$  is the logarithm of GDP per capita. Following Ravallion and Chen (1997), the chapter also controls for the logarithm of the Gini

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<sup>3</sup> Table A1 in the appendix A presents the list of countries.

<sup>4</sup> The latter period is the mean of the two last years. The results remain unchanged when we reproduced the baseline results without the two last years. This approach has been used in the literature, for instance Giuliano and Ruiz-Arranz (2009) split their sample period into 6 non-overlapping 5-year periods except for the last period, which is the average of the three last years.



index ( $\ln GINI_{it}$ ) to control for the potential impact of income distribution on poverty.<sup>5</sup>  $Gov_{it}$  denotes a set of the six governance indicators plus our aggregated indicator of governance, which we obtained using the Principal Component Analysis (PCA).  $X_{it}$  represents the set of control variables. This set includes variables related to health, human capital, infrastructure, openness to trade, employment and financial variables. These control variables reflect the state of the empirical literature on the determinants of economic growth and poverty reduction. Table A2 in the appendix A summarizes the description and source of the variables and Table A3 presents statistical summaries of the main variables.  $\alpha_i$  indicates country-specific effects,  $\mu_t$  time-specific effects, and  $\varepsilon_{it}$  is the time-varying error term.

In addition to fixed effects estimations, the chapter also relies on the Generalized Method of Moments in System (SYS-GMM) to address potential endogeneity due to reverse causality as well as allowing for a dynamic process, which may be more appropriate when analyzing persistent phenomenon overtime such as poverty and inclusiveness.

## **2.4. Data**

### **2.4.1. Measuring Poverty and Inequality**

The chapter uses two main datasets to capture poverty and inclusiveness. The income of the bottom 20 percent and the income share of the first quintile are from the Kleineberg-Kraay's (DKK)<sup>6</sup> dataset. This dataset builds on a larger dataset of 963 country-year observations for which household surveys are available. It emerges from the fusion of the Luxembourg Income Study (LIS) database, covering mostly developed countries, and the World Bank's POVCALNET database, covering essentially developing countries. The survey means in LIS are converted to constant 2005 USD in order to be consistent with POVCALNET data. DKK's dataset covers a total of 151 countries between 1967 and 2011.

The poverty headcount ratio at \$2 a day in purchasing power parity is from the World Development Indicators (WDI) dataset. This measure is based on the percentage of the population living on less than \$2 a day at 2005 international prices. In addition, the chapter

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<sup>5</sup> Growth in average income can shift the income distribution while variations in inequality can also change the shape of income distribution. Both effects can impact the income of the poor and poverty headcount ratios.

<sup>6</sup> See <https://www.econstor.eu/bitstream/10419/95564/1/767021142.pdf>

measures mean income – per capita income – as real per capita GDP<sup>7</sup> at purchasing power parity in constant 2005 international dollars. The logarithm of the Gini index is our measure of inequality. The Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. The Gini index measures the area between the Lorenz<sup>8</sup> curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

## **2.4.2. Defining and Measuring Governance**

The concept of Governance is widely discussed among scholars and policymakers. It means different things to different people and there is yet no consensus around its definition. Consequently, there are varying definitions of Governance. Theoretically, governance can be defined as “the rule of the rulers”, typically within a given set of rules. In the context of economic growth and poverty reduction, governance refers to essential parts of the wide-ranging cluster of institutions. The United Nations Development Program (UNDP, 1997) defines governance as “the exercise of economic, political, and administrative authority to manage a country’s affairs at all levels. It comprises mechanisms, processes, and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations, and mediate their differences.”

According to the World Bank (1993), governance is the process through which power is exercised in the management of a country’s political, social and economic institutions for development. Kaufmann, Kraay and Zoido-Lobaton (1999) explain that “the fundamental aspects of governance” are graft, rule of law, and government effectiveness. Other dimensions are: voice and accountability, political instability and violence, and regulatory burden”. Within this notion of governance, the evident interrogation is: what is good governance? This chapter associates the quality of governance with democracy and transparency, with the rule of law and good civil rights, and with efficient public services. Also, the quality of governance is determined by the impact of this exercise of power on the quality of life enjoyed by the citizens.

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<sup>7</sup> In the chapter, per capita income and per capita GDP are equivalent.

<sup>8</sup> A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household.

To measure the concept of good governance, we use the Worldwide Governance Indicators (WGI). The WGI – developed by Kaufmann et al. (2005) have been proposed by the World Bank to estimate good governance. There exist three dimensions of governance: political, economic and institutional dimensions. The six governance indicators<sup>9</sup> can be classified into three groups with two indicators in each cluster. First, the political feature of governance is proposed to capture the process by which government is nominated, supervised and replaced. The political feature encompasses two indicators – *voice and accountability* and *political stability*. The second dimension is the economic governance, which includes *government effectiveness* and *regulatory quality*. The third dimension represents the institutional feature of governance. It involves *rule of law* and *control of corruption* indicators.

### 2.4.3. Main explanatory variables

This section discusses the theoretical and expected impact of the main explanatory variables included in equation (2.1):

- **Income per capita** measured by the logarithm of per capita GDP and its squared term to capture a potential Kuznets curve hypothesis. The Kuznets curve hypothesis predicts that inequality will increase with rising incomes in initial stage of development and decrease at higher levels of development. Yet, the existing evidence for the Kuznets curve hypothesis is mixed (Kanbur, 2000; Barro, 2008; Woo et al., 2017).
- **Human capital** captured by the ratio of the gross enrolment in secondary schooling. Studies found that improvements in human endowments, through increases in education are strongly associated with poverty reduction and economic growth (Barro and Sala-i-Martin, 2004; Mankiw et al., 1992; among others). Human capital can reduce poverty in three main ways (Berg, 2008): (i) higher educational attainments lead to higher earnings, (ii) better quality and higher levels of education are associated with economic growth which subsequently increases economic opportunities, (iii) higher levels of education are correlated with higher social benefits, improving the healthcare of the poor. In addition, in empirical studies low educational attainments are often identified as a source of income inequality. Education expansion can help reduce income inequality (Corak, 2013; De Gregorio and Lee, 2002). However, the link between

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<sup>9</sup> The point estimates range from -2.5 (weak governance) to 2.5 (strong governance).

human capital accumulation and income inequality can be ambiguous (Knight and Sabot, 1983).

- **Trade openness** measured by the sum of exports and imports in percent of GDP. The theoretical relationship between trade openness and poverty is ambiguous (see Le Goff and Jan Singh, 2014). This ambiguity is also present in the empirical literature. While some studies found that trade openness do not impact poverty (Beck et al., 2007, Kpodar and Singh, 2011), others suggested a positive relationship between trade openness and poverty (Guillaumont-Jeanneney and Kpodar, 2011, Singh and Huang, 2011). In addition, Agenor (2004) found an inverted U-shaped link between globalization and poverty that globalization. Globalization leads to decreases in poverty above a certain level of globalization. Regarding the relationship between trade openness and inequality, the literature has been inconclusive, overall (Krugman 2008; Meschi and Vivarelli 2007) even though any studies show that trade openness is associated with lower income inequality (IMF, 2007, Woo and others, 2017).
- **Public spending** captured by respectively public spending on education and health in percent of GDP. The empirical literature suggests that higher spending on education and health is associated with reduced income inequality and poverty.
- **Basic needs** measured by the percentage of population with access to improved sanitation. The poorest people tend to be the ones with no or limited access to basic services. Better access to improved sanitation is expected to reduce poverty.
- **Inflation** measured by the change of consumer price index. Inflation tends to worsen poverty (Powers, 1995; Agenor, 1998 among others). It also tends to disproportionately hurt the poor and increase inequality (Albanesi, 2007; Fischer and Modigliani, 1978).
- **Financial development and openness** captured by M2 and the Chinn Ito index of capital account openness. The relationship between financial sector development and economic growth has been well established in the academic empirical literature (King and Levine, 1993; Levine, Loayza and Beck, 2000; Levine, 2005). Finance can positively impact growth through capital accumulation and technological progress. Financial systems produce information ex ante about possible investments, promote efficient allocation of capital, mobilize and pool savings. Empirical studies also find that financial development is associated with reductions in the growth of Gini and poverty (Beck, Demirgüç-Kunt and Levine, 2007; Honohan, 2004).

- **Unemployment** captured by the unemployment rate is expected to be positively associated with income inequality as unemployed, inactive and unskilled workers are more present in the bottom 20 percent of the income distribution (Martinez, Ayala and Ruiz-Huerta, 2001).
- **Good governance** measured by the six Worldwide Governance Indicators (WGI). The existing literature shows that good governance has a positive impact on pro-poor growth (Kaufmann and Aart, 2002; Dollar and Kraay, 2002; Kraay, 2004) and is therefore expected to have the same impact on inclusive growth.

## **2.5. Pro-poor and Inclusive Growth: Empirical Evidence**

### **2.5.1. Has growth been pro-poor and inclusive?**

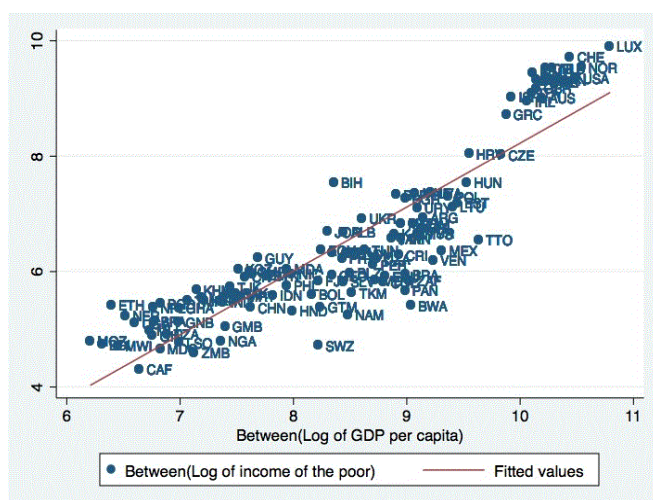
Before analyzing regressions, a simple plotting illustrates the tight link between poverty reduction and per capita income growth. In both transformed between- and within-variables, income growth is associated with higher income among the poor (Figure 2.1).

As a starting point, the chapter examines the impact of economic growth on the income of the poorest 20 percent and the poverty headcount at \$2 a day to examine the extent to which growth is pro-poor. The coefficient of interest is  $\beta$ , which gives the impact of economic growth on poverty reduction (the equation is in logarithm terms);  $\gamma$  measures the effect of a change in the Gini index on poverty reduction.

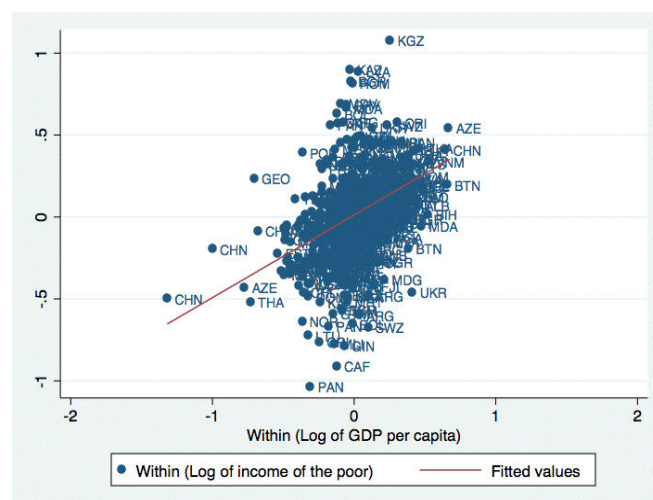
Because the chapter defines growth as pro-poor if it reduces poverty (Ravallion and Chen 1997), the results suggest that growth is generally pro-poor using the two indicators. A 1 percent increase in real GDP per capita leads to about a 1.4 percent increase in the income of the poor (Table 2.1, column 5). A similar 1.0 percent increase in real GDP per capita leads to a decrease of about 2.3 percent in the poverty headcount (Table 2.2, column 3). The results also show that inequality increases poverty.

**Figure 2.1. Growth and the income of the poor**

**a.** Between transformed variables



**b.** Within transformed variables



**Table 2.1. Pro-poor growth regressions- income of the poorest 20 percent**

Variables	(1) lnyp	(2) lnyp	(3) lnyp	(4) lnyp	(5) lnyp	(6) lnyp
Log of GDP per capita	0.60*** (0.05)	0.66*** (0.05)	1.11*** (0.05)	0.98*** (0.03)	1.42*** (0.14)	1.02*** (0.08)
Log of Gini Index		-1.37*** (0.13)		-2.01*** (0.2)		-1.64*** (0.26)
Constant	1.47*** (0.49)	5.79*** (0.67)	-2.87*** (0.44)	5.6*** (0.89)	-5.53*** (1.27)	3.82** (1.29)
Observations	517	426	517	426	517	426
R-squared	0.21	0.4	0.8	0.9		
AR(1) test					0.66	0.51
AR(2) test					0.3	0.23
P-Value Hansen test					0.11	0.2
Number of countries	112	109	112	109	112	109
Model	FE	FE	BE	BE	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

**Table 2.2. Pro-poor growth regressions- poverty headcount ratio at \$2**

Variables	(1) lnP	(2) lnP	(3) lnP	(4) lnP
Log of GDP per capita	-1.024*** (0.13)	1.15*** (0.12)	-2.25*** (0.44)	-1.66*** (0.21)
Log of Gini Index		2.53*** (0.33)		3.93*** (0.66)
Constant	11.17*** (1.13)	2.84* (1.52)	21.29*** (3.64)	1.88 (3.01)
Observations	424	421	424	421
R-squared	0.14	0.27		
AR(1) test			0.9	0.81
AR(2) test			0.57	0.1
P-Value Hansen test			0.13	0.2
Number of countries	92	92	92	92
Model	FE	FE	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

On the other hand, following Dollar and Kraay (2002), this section first examines the relationship between per capita income and a broad definition of inclusiveness, that is, the bottom quintile share of the income distribution (Figure 2.2). Debates on inclusiveness usually focus on the incidence of poverty and the income distribution among individuals and households in society. Thus, income shares are conventional metrics for gauging the distributive impact of policies.

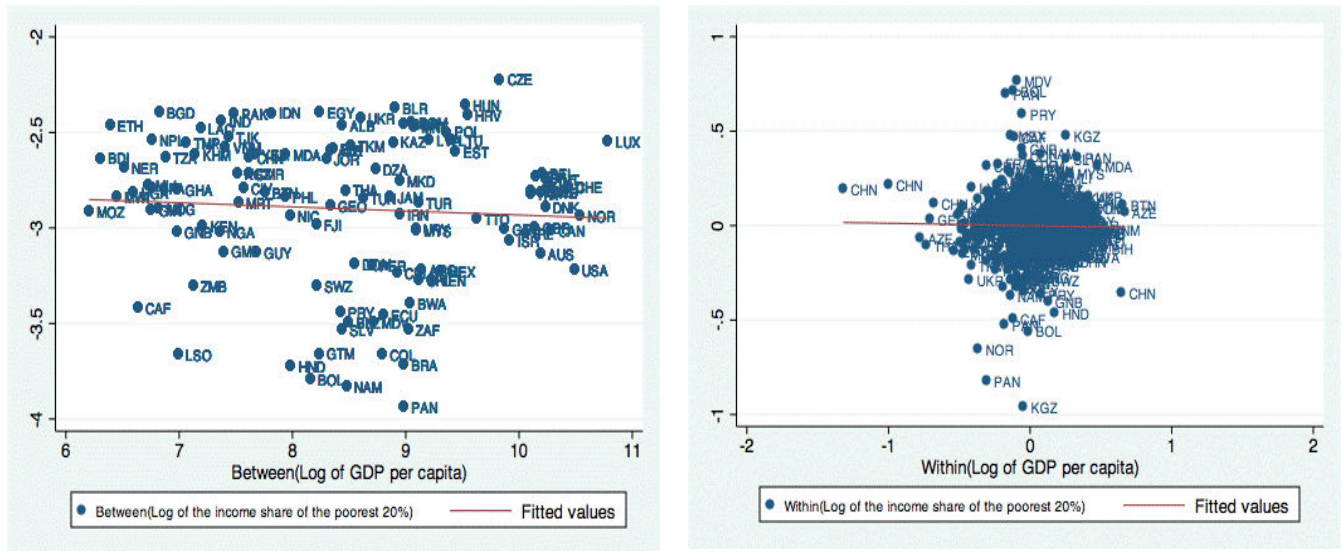
As in the section on pro-poor growth, a two-step approach is followed by, first, assessing the impact of income growth on the bottom quintile income share and, second, by analyzing the impact of governance. Because the chapter considers growth as inclusive if income growth is associated with an increase in the bottom quintile share of the income distribution, growth is inclusive if  $\beta$  is greater than zero. The results reported in Table 2.3 show no evidence of inclusive growth (column 2, baseline model): the coefficient is positive, but not significant.<sup>10</sup>

<sup>10</sup> In column (1), the log of GDP per capita and the square of GDP per capita are used as explanatory variables to consider the Kuznets relationship (Barro 2008; Woo et al. 2017). In the literature, the existing evidence of the Kuznets curve is mixed. Our data do not support evidence of the Kuznets inverted U-shaped link between GDP per capita and inequality (measured by the income shared of the poorest 20 percent).

**Figure 2.2. Inclusive growth**

**a.** Between transformed variables

**b.** Within transformed variables



**Table 2.3. Governance and inclusive growth regressions**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	lnQ	lnQ	lnQ	lnQ	lnQ	lnQ	lnQ	lnQ
Log of GDP per capita	1.01	0.11	0.08	-0.77	-0.03	0.37	-0.25	-0.15
	(0.67)	(0.08)	(0.25)	(0.67)	(0.08)	(0.51)	(0.43)	(0.26)
Log of GDP per capita, squared	-0.06							
	(0.03)							
Control of Corrup			0.04					
			(0.24)					
Gov. Effectiveness				0.84*				
				(0.46)				
Political Stability					-0.006			
					(0.10)			
Regulatory quality						0.35		
						(0.44)		
Rule of law							0.58*	
							(0.33)	
Voice and Account								-0.01
								(0.13)
Constant	-7.08***	-3.85***	-3.63	3.76	-2.62***	-6.16	-0.65	-1.58
	(2.80)	(0.74)	(2.24)	(5.80)	(0.75)	(4.38)	(3.78)	(2.31)
Observations	522	522	330	330	330	330	330	330
AR(1) test	0.31	0.32	0.48	0.15	0.44	0.09	0.45	0.57
AR(2) test	0.13	0.17	0.59	0.87	0.32	0.71	0.66	0.26
P-Value Hansen test	0.02	0.002	0.69	0.37	0.77	0.86	0.41	0.77
Number of countries	112	112	110	110	110	110	110	110
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.



## **2.5.2. Pro-poor and inclusive growth: the role of governance**

### ***2.5.2.1. Governance and pro-poor growth***

As a second step, the chapter adds indicators of governance in the estimating equation to capture the impact of good governance on poverty reduction. All indicators of governance, except political stability and absence of violence, seem to have an impact on poverty (Table 2.4). A one percent increase of the aggregated governance index, which combines political, economic and institutional features of good governance, increases the income of the poor by 14 percent.<sup>11</sup> Because corrupt governments can distort decision making in favour of projects that profit the few rather than the many, reforms for good governance positively impact poverty reduction by providing better opportunities to the poor. This is most likely to happen through better rule of law (including property rights), which improve economic prospects and better ensure access to pro-poor public goods such as health and education. Indeed, zooming on institutional governance, which is represented by rule of law, control of corruption and accountability, the results suggest that a better rule of law and control of corruption significantly increases the income of the poor. A government accountable to its people is also more prone to implement pro-poor policies than otherwise. This chapter (Table 2.4, columns 3 and 5) shows that regulatory quality and control of corruption have larger impacts on the income of the poor as compared to other governance indicators. An improvement in government effectiveness or regulatory quality positively impacts the income of the poor. A one point increase in government effectiveness and regulatory quality improves the income of the poor by respectively 35 and 42 percent. A one-point increase in the control of corruption leads to an increase of about 39 percent in the income of the poor.

In general, corruption impacts negatively economic growth by impeding some drivers of potential growth such as public and private investment, human capital accumulation, macroeconomic and financial stability, and total factor productivity (IMF 2016). Yet, corruption tends to have greater impacts for the poor. For instance, in a corrupt system, the provision of social services is inefficient in the way that the use of government-funded programs (for example health and education programs) tends to benefit wealthier people in the society. As shown in Gupta, Davoodi, and Tiongson (2002), the misappropriation of funds from poverty reduction programs by well-connected individuals, reduces the impact of social programs on income distribution and poverty. Regulatory quality is also an important factor of

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<sup>11</sup> The index is constructed through principal component analysis.

poverty reduction. It matters to ensure that the regulation promotes the creation of an enabling environment that contributes to economic growth and the wellbeing of people in the society. Results found in this chapter are consistent with previous empirical findings and robust when poverty headcount ratio is used as an alternative poverty indicator (appendix, Table A5).

In this line, Acemoğlu and Robinson (2012, 3), in *Why Nations Fail*, argue that less developed countries such as Egypt are poor because “it [Egypt] has been ruled by a narrow elite that have organized society for their own benefit at the expense of the vast mass of people. Political power has been narrowly concentrated and has been used to create great wealth for those who possess it.”

They defend that developed countries such as the United Kingdom and the United States grew successful because they created inclusive institutional and political arrangements that benefit society as a whole.

**Table 2.4. Governance and pro-poor growth regressions**

Variables	(1) lnyp	(2) lnyp	(3) lnyp	(4) lnyp	(5) lnyp	(6) lnyp	(7) lnyp
Log of GDP per capita	0.94*** (0.15)	0.75*** (0.14)	0.87*** (0.13)	0.9*** (0.08)	0.85*** (0.12)	0.88*** (0.1)	0.83*** (0.7)
Log of Gini Index	-1.21*** (0.42)	-1.65*** (0.33)	-1.4*** (0.37)	-1.41*** (0.31)	-1.33*** (0.38)	-1.38*** (0.3)	-1.67*** (0.29)
Governance	0.14** (0.07)						
Control of corrup		0.39*** (0.13)					
Gov. Effectiveness			0.35** (0.15)				
Political Stability				0.08 (0.08)			
Regulatory quality					0.42*** (0.12)		
Rule of law						0.24* (0.13)	
Voice and Account.							0.25*** (0.08)
Constant	2.94 (2.45)	6.22*** (2.14)	4.26** (2.2)	3.46** (1.51)	4.06** (1.96)	4.08** (1.53)	5.52*** (1.43)
Observations	286	286	286	286	286	286	286
AR(1) test	0.43	0.45	0.49	0.24	0.41	0.41	0.21
AR(2) test	0.49	0.07	0.33	0.18	0.89	0.33	0.05
P-Value Hansen test	0.05	0.01	0.14	0.05	0.04	0.15	0.07
Number of countries	107	107	107	107	90	107	107
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses:\*\*\* p<0.01,\*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

### **2.5.2.2. Governance and inclusive growth**

Inclusiveness involves dimensions other than poverty and income distribution, such as governance, which in itself impact income distribution. Building effective institutions could therefore be important to make growth inclusive. This raises the question about which key governance factors and mechanisms could facilitate growth and promote inclusiveness.

To this end, the baseline model is estimated using the income share of the poor as dependent variable and governance indicators as explanatory variables. Results are shown in the six last columns of Table 2.3. The inclusiveness coefficient is not significant for any of the specifications, thereby illustrating that growth has not been inclusive.

While other indicators of good governance are not significantly associated with the income share of the poorest 20 percent, results show that government effectiveness (economic

governance) and rule of law (institutional governance) are key in increasing the income share of the poorest 20 percent. Government effectiveness has greater impact than rule of law: a one-point increase in the government effectiveness index increases the income share of the poorest 20 percent by 84 percent while a similar one-point increase in the rule of law index leads to an increase of 58 percent in the income share of the poorest 20 percent.

The results illustrate that economic growth should be complemented with liable and transparent public administration, effective government policies, and confidence in the rules of society, which could lead to a non-discriminatory redistribution of the gains of growth. The practice of inclusive growth requires effective implementation of policies and institutions allowing the share of benefits from economic growth. These policies could also support a fair income distribution and better social inclusion through better education systems, social insurance and labour markets. Indeed, as shown in Gupta et al. (2015), fiscal policy is an important tool for income distribution. For a country to attain inclusive growth besides government effectiveness, strong rule of law is needed. This institutional feature of good governance allows better property rights and business regulations, and effective enforcement by the legal system.

### **2.5.3. Other determinants of pro-poor and inclusive growth**

In this subsection, the chapter determines what other factors determine pro-poor and inclusive growth. It also assesses the robustness of results found in the previous sections after controlling for other determinants of poverty and inequality as identified in the empirical literature.

The results presented in Table 2.5 confirm the main results: growth has been pro-poor as per capita income growth has positively and significantly impacted the income of the poor; and the control of corruption is positively associated with increases in the income of the poor. Controlling for other potential determinants of poverty also shows that better health services (captured by health care expenditure, lower infant mortality or lower prevalence of HIV), better access to education (captured by spending in education or secondary school enrolment) are individually associated with higher income of the poor. In addition, improvement in sanitation infrastructure and financial openness increase the income of the poor.<sup>12</sup> Combining these

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<sup>12</sup> This chapter does not find a significant effect of trade openness on the income of the poor. Results in the empirical literature are mixed on this. For instance, Lopez (2004) suggested that the impact of trade openness on the poor might vary according to the sectors in which the poor are concentrated. Measuring trade openness as the volume of trade adjusted by a country's size and population, he found that while

different factors into a single estimation could raise the issue of multicollinearity. Selectively introducing few variables together confirms the role of education, financial development, and financial openness in increasing the income of the poor.

Turning to inclusive growth regressions, Table 2.6 shows important results. Findings confirm that growth has not been inclusive as growth in per capita income leads to a decrease in the income share of the poor. Inflation has a slightly positive effect on the income share of the bottom quintile. Trade openness and sanitation improvement have positive impacts: a 1 percent increase in trade openness increases the income share of the poor by 0.3 percent, while a similar increase in sanitation improvement increases the income share of the bottom quintile by 1 percent (Column 3). Unemployment and financial openness negatively impact the bottom quintile income share even though the coefficient is not significant. Besides, secondary school enrolment benefits the poor (Column 4). Estimates from the fifth specification show that financial development (M2) increases the income share of the poorest 20 percent by 0.1 percent. In a nutshell, government effectiveness, infrastructure improvement, trade openness, human capital and financial development are pro-inclusive policies.

Regressions of shared prosperity i.e. considering the share of the bottom 40 percent of the income distribution broadly confirm these results (appendix, Table A6).

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trade openness appears to increase poverty in the short run, it is negatively correlated with poverty in the long run.

**Table 2.5. Structural determinants of pro-poor growth**

Variables	(1) lnyp	(2) lnyp	(3) lnyp	(4) lnyp	(5) lnyp	(6) lnyp	(7) lnyp	(8) lnyp	(9) lnyp	(10) lnyp	(11) lnyp
Log of GDP per capita	0.65*** (0.1)	0.40** (0.18)	0.55*** (0.07)	0.91*** (0.15)	0.59*** (0.16)	0.46*** (0.18)	0.73*** (0.1)	0.72*** (0.1)	0.88*** (0.09)	0.55*** (0.11)	0.45*** (0.14)
Log of Gini Index	-1.73*** (0.25)		-1.61*** (0.09)		-1.08*** (0.34)	-0.92** (0.53)	-1.43*** (0.3)	-1.54*** (0.31)	-1.89*** (0.37)	-1.87*** (0.26)	-1.7*** (0.4)
Control of Corrup	0.35*** (0.12)	0.62*** (0.14)	0.012 (0.13)	0.33** (0.14)	0.43*** (0.13)	0.5*** (0.16)	0.42*** (0.11)	0.39*** (0.13)	0.22** (0.11)	0.4*** (0.12)	0.26* (0.1)
Hegdp	0.06* (0.03)										0.03 (0.04)
Mortality5		-0.006** (0.003)									
pVIH			-0.02* (0.01)								
SpendingEdu				0.17*** (0.06)							0.06* (0.03)
SchoolSec					0.007** (0.004)						
Sanitation						0.013** (0.007)					0.005 (0.004)
Inflation							0.00* (0.0006)				0.02 (0.001)
M2								0.001 (0.002)			0.006** (0.002)
Openness									-0.002 (0.002)		-0.002 (0.002)
FinOpenness										0.09 (0.06)	0.09* (0.05)
Constant	7.1*** (1.29)	3.53** (1.71)	7.56*** (1.11)	-1.94*** (1.34)	4.88*** (1.78)	5.02** (2.61)	5.57*** (1.75)	5.95*** (1.97)	6.14*** (1.69)	8.65*** (1.54)	7.92*** (1.66)
Observations	286	328	202	287	251	284	276	284	286	283	236
AR(1) test	0.3	0.9	0.23	0.42	0.85	0.47	0.4	0.43	0.33	0.53	0.13
AR(2) test	0.17	0.6	0.04	0.9	0.13	0.15	0.12	0.11	0.08	0.04	0.56
P-value Hansen test	0.09	0.102	0.51	0.2	0.104	0.096	0.109	0.09	0.13	0.108	0.27
Number of countries	107	110	70	103	102	106	104	107	107	105	95
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses:\*\*\* p<0.01,\*\* p<0.05,\*<0.1. Diagnostic tests (Hansen and 1st and 2nd-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

**Table 2.6. Structural determinants of inclusive growth**

Variables	(1) lnQ	(2) lnQ	(3) lnQ	(4) lnQ	(5) lnQ	(6) lnQ
Log of GDP per capita	-0.12 (0.11)	-0.23** (0.11)	-0.34** (0.13)	-0.27*** (0.10)	-0.44*** (0.15)	-0.51*** (0.14)
Gov. Effectiveness	0.23** (0.12)	0.15 (0.11)	0.28** (0.11)	0.03 (0.08)	0.21* (0.10)	0.24** (0.11)
SpendingEdu	0.02 (0.05)	0.01 (0.03)	-0.01 (0.04)			
SchoolSec				0.01*** (0.002)	0.005 (0.004)	0.002 (0.004)
FinOpenness	-0.08 (0.06)	-0.06 (0.04)	-0.06 (0.04)	-0.02 (0.04)	-0.10 (0.08)	-0.03 (0.04)
Openness	0.003 (0.002)	0.001 (0.001)	0.003* (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Inflation	0.001** (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.003 (0.002)	0.001 (0.00)
M2	-0.00 (0.00)	-0.00 (0.001)	-0.00 (0.001)	0.00 (0.001)	0.001* (0.001)	0.00 (0.001)
Sanitation		0.009*** (0.003)	0.01** (0.00)		0.009** (0.004)	0.012** (0.005)
Unemployment			-0.01 (0.01)			-0.006 (0.01)
Hegdp			-0.001 (0.03)			0.02 (0.03)
Constant	-2.17** (0.92)	-1.7** (0.83)	-0.67 (0.98)	-1.44* (0.75)	-0.47 (1.14)	0.24 (1.05)
Observations	231	269	226	277	272	231
AR(1) test	0.16	0.95	0.68	0.42	0.4	0.84
AR(2) test	0.61	0.16	0.12	0.28	0.73	0.14
P-Value Hansen test	0.55	0.43	0.81	0.45	0.08	0.91
Number of countries	89	98	88	100	99	88
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

## **2.6. Nonlinear and threshold estimations**

### **2.6.1. Exogenous nonlinear estimation**

This section discusses a possible evidence of linearity or nonlinearity from two perspectives: (a) a differentiation by the quality of governance and (b) a differentiation by the level of development. A simple test consists of exogenously splitting the sample according to the median level of the variables of interest (level of development or governance) as a threshold point.

Regarding the pro-poor regressions, the first step (a) consists in investigating the effect of growth and governance on the income of the poor as a function of the quality of governance.<sup>13</sup> As in the previous section, the sample is split in two groups of countries according to the median level of governance indicators. Countries that are below the median are those that have lower governance quality while those above the median have greater governance quality. The results presented in the second and third columns of Table 2.7 do not provide any evidence of a differentiated impact of growth on the income of the poor depending on the quality of governance. For instance, considering the indicator of control of corruption, the effect of a 1 percent increase in income per capita on the income of the poor goes from 0.82 to 0.81. However, the quality of governance seems to matter for the income of the poor only in countries with relatively adequate level of governance. These findings are also robust to the introduction of additional control variables as in the previous section.

In the second step (b), the chapter also examines the impact of good governance on the income of the poor as a function of the level of development.<sup>14</sup> Results reported in the first column of Table 2.7 illustrate interesting heterogeneity. Higher growth has a larger impact on the income of the poor in more developed countries; growth increases income per capita more than proportionally in these countries. While better control of corruption increases the income of the poor in countries with per income above the median level (\$5,227 PPP constant 2005 international U.S. dollars), its impact is not significantly in less developed countries (countries

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<sup>13</sup> The quality of governance is captured by two indicators: the aggregated governance indicator and control of corruption.

<sup>14</sup> The chapter retains control of corruption as a proxy for good governance in pro-poor growth regressions.



with per capita income below the median level)<sup>15</sup>. This differentiation is robust to the introduction of additional control variables (education, health, trade openness, financial development, etc.) discussed in the previous section. The finding suggests that, in opposite to higher income countries, less developed countries may not be successful in controlling corruption in such a way that it could influence the income of the less fortunate.

**Table 2.7. Pro-poor growth and governance: non-linearity**

	(1)		(2)		(3)	
	Governance		Control of Corruption		Level of Development	
	Below	Above	Below	Above	Below	Above
Log of GDP per capita	0.74*** (0.12)	0.67*** (0.21)	0.82*** (0.11)	0.81*** (0.13)	0.6*** (0.17)	1.25*** (0.14)
Log of Gini Index	-1.79*** (0.45)	-0.88*** (0.3)	-1.4*** (0.34)	-1.34*** (0.35)	-1.63*** (0.34)	-1.68*** (0.26)
Control of Corrup			0.05 (0.18)	0.61*** (0.17)	-0.02 (0.15)	0.21** (0.08)
Governance	-0.005 (0.09)	0.43*** (0.13)				
Constant	6.6*** (2.27)	3.68* (2.19)	4.57** (1.74)	4.3** (1.79)	7.09*** (2.04)	1.58* (1.9)
Observations	156	127	154	132	146	140
AR(1) test	0.83	0.35	0.63	0.47	0.25	0.23
AR(2) test	0.05	0.05	0.07	0.14	0.61	0.08
P-Value Hansen test	0.42	0.25	0.13	0.58	0.32	0.13
Number of Countries	63	64	66	65	58	59
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \*p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

Turning to inclusive growth regressions, results (step (a)) show that growth has not been inclusive neither in countries below the median level of governance and government effectiveness nor above these thresholds (Table 2.8, columns 1 and 2). The coefficient associated to inclusive growth is negative and significant for countries with lower governance level while this coefficient is negative but not significant for countries with higher level of governance.

The second step (b) as in the pro-poor growth regressions consists in examining the impact of good governance on the income share of the poor as a function of the level of development.

<sup>15</sup> This chapter relies on an approach that consists in splitting the sample below and above the median of variables of interest in order to capture the potential nonlinear relationship (see Giuliano and Ruiz-Arranz, 2009). Unlike regressions with interaction terms, this approach relies on a threshold point, which is the median level of variables of interest (log of GDP per capita and control of corruption).

Findings suggest that growth has not been inclusive in less developed countries while the coefficient associated with inclusive growth is positive but not significant for more developed countries (Table 2.8, column 3). In addition, coefficients associated with the two governance indicators (government effectiveness and governance) are not significant.

**Table 2.8. Inclusive growth and governance: non-linearity**

	(1)		(2)		(3)	
	Governance		Government Effectiveness		Level of Development	
	Below	Above	Below	Above	Below	Above
Log of GDP per capita	-0.14** (0.06)	-0.034 (0.06)	-0.11* (0.059)	-0.08 (0.079)	-0.20* (0.08)	0.17 (0.11)
Governance	-0.045 (0.058)	0.06 (0.05)				
Gov. Effectiveness			0.03 (0.18)	0.15 (0.105)	0.08 (0.11)	-0.07 (0.08)
Constant	-1.79*** (0.46)	-2.71*** (0.53)	-1.96*** (0.47)	-2.30 (0.65)	-1.25* (0.64)	-4.55*** (1.08)
Observations	161	169	160	170	148	182
P-Value Hansen test	1.00	1.00	1.00	1.00	1.00	1.00
Number of Countries	64	66	60	63	59	61
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

## 2.6.2. Endogenous nonlinear estimation: Panel Smooth Transition Regression

In this section, the chapter further analyses the nonlinear relationship between pro-poor, inclusive growth and governance. The chapter introduces and estimates the Panel Smooth Transition Regression (PSTR) model, developed by Gonzalez, Tervirta and Dijk (2005), to accommodate other issues that have arisen in the literature on the relationship between poverty reduction, economic growth and good governance, and to test the robustness of our results.

The section first (i) investigates the impact of growth on the income of the poor as a function of the level of governance quality and (ii) examines the impact of good governance on the income of the poor as a function of development level. Second, it (iii) assesses the impact of growth on the income share of the bottom quintile as a function of the level of governance quality and (iv) examines the nonlinear relationship between governance and the income share of the bottom quintile as a function of the level of development. An alternative procedure to test these nonlinear relationships would have been the introduction of interaction terms, for instance between governance indicators and the level of development, in the regressions. While

this approach allows accounting for nonlinearity, it does not permit to explicitly model the dynamics exerted by such nonlinearity.

Compared with the introduction of interaction terms and the median value as an exogenous threshold, the PSTR has first the advantage to allow the governance–growth nexus to vary over time according to the level of development. Second, it allows the relationship between growth and income of the poor to vary over time according to the level of governance quality. The PSTR specification considers the speed of transition from one regime to the other with the passage from one regime to another being gradual. Additionally, it provides the threshold values of (i) the level of governance quality and (ii) the level of development at which the dynamics of the relationships change.

The PSTR methodology compared to SYS-GMM has the advantage to account for sufficient heterogeneity given the disparity in the sample of study. It allows the coefficients of equations (2.4), (2.7), (2.9) and (2.10) to vary across countries and over time, depending on the level of the threshold variable. As the PSTR model is a regime-switching model, the change in the coefficients is gradual and smooth.

The general PSTR model that allows for  $(r + 1)$  different regimes is as follows:

$$y_{it} = u_i + \lambda_t + \beta_0 X_{it} + \sum_{j=1}^r \beta_j' X_{it} g_j(q_{it}^{(j)}, \gamma_j, \delta_j) + \varepsilon_{it} \quad (2.2)$$

Where the transition functions  $g_j(q_{it}^{(j)}, \gamma_j, \delta_j)$ ,  $j = 1, \dots, r$ , are given by:

$$g(q_{it}, \gamma, \delta) = \left[ 1 + \exp[-\gamma \prod_{j=1}^m (q_{it} - \delta_j)] \right]^{-1}, \gamma > 0 \text{ and } \delta_1 < \delta_2 \dots < \delta_m \quad (2.3)$$

with polynomial degrees  $m_j$ .  $\delta = (\delta_1, \dots, \delta_m)'$  is a vector of location parameters and  $\gamma$  represents the smooth parameter.

While SYS-GMM directly deals with potential endogeneity issues, PSTR does not. Therefore, to handle potential endogeneity issues by reducing the risk of reverse causality, the PSTR models in this chapter use one-period lagged values of all explanatory variables that could be potentially endogenous. This approach follows the recent empirical literature (see Allegret et al., 2014).

### 2.6.2.1. Estimation of Models (i) and (ii)

For the first model (i), the PSTR model with  $r = 1$  is defined as follows:

$$\ln y_{it} = u_i + \lambda_t + \beta_0 X_{it-1} + \beta_1 \ln GDP_{pc_{it-1}} g(Gov_{it-1}, \gamma, \delta) + \varepsilon_{it}, \quad (2.4)$$

where  $\ln y_{it}$  denotes the logarithm of income of the 20 percent poorest;  $X_{it-1}$  represents a vector of control variables: log of GDP per capita, public spending on education as a percentage of GDP, inflation, money and quasi-money (M2/GDP), inflation, improvement in sanitation, trade openness as a percentage of GDP and financial openness at period  $t - 1$  for country  $i$  (linear part of the model);  $\ln GDP_{pc_{it-1}}$  is the logarithm of the GDP per capita (nonlinear part);  $Gov_{it-1}$  represents the governance indicator, control of corruption;  $u_i$  is an individual fixed effect;  $\lambda_t$  represents time effects; and  $\varepsilon_{it}$  stands for the idiosyncratic error. Moreover, the transition function is given by a logistic function:

$$g(Gov_{it-1}, \gamma, \delta) = [1 + \exp[-\gamma(Gov_{it-1} - \delta)]]^{-1}, \gamma > 0 \quad (2.5)$$

Where  $g(Gov_{it-1}, \gamma, \delta)$  is a continuous function and it is bounded between  $[0,1]$ . It depends on the transition function i.e. control of corruption ( $Gov_{it-1}$ ), a smooth parameter  $\gamma$ , and a threshold parameter  $\delta$ .

Accordingly, the marginal effect of income growth depending on governance quality and is given by:

$$e_{it} = \frac{\partial \ln y_{it}}{\partial \ln GDP_{pc_{it-1}}} = \beta_0 + \beta_1 g(Gov_{it-1}, \gamma, \delta) \quad (2.6)$$

The properties of the transition function involve:

$$e_{it} \rightarrow 0 \text{ if } Gov_{it-1} > 0 \text{ or } e_{it} \rightarrow 1 \text{ if } Gov_{it-1} < 0$$

When estimating the parameters of the PSTR model, the individual effects  $u_i$  are removed by eliminating individual-specific means and thus it is a transformed model by nonlinear least squares that one estimates (González et al., 2005). The testing procedure of González et al. (2005) consists of: first testing the linearity against the PSTR model, and second determining the number  $r$  of transition function. Considering equation (2.4), the linearity check consists in testing:  $H_0: \gamma = 0$  or  $H_0: \beta_1 = 0$ . Then three standard tests can be applied using these statistics: Lagrange Multiplier of Fisher ( $LM_F$ ), Wald test ( $LM$ ), and Pseudo Likelihood-ratio ( $LRT$ ).

Tests of linearity also show evidence of nonlinearity (Table 2.9). Table 2.10 reports the estimates of the PSTR model. It shows that all the control variables have the expected signs, except public spending on education. Results also show that depending on the transition function<sup>16</sup>, the effects of income growth on the income of the poor are positive and significant (Table 2.10). The effect of growth on the income of the poorest 20 percent increases with the control of corruption. Figure 2.3 illustrates these findings.

Control of corruption is good for pro-poor growth, especially after reaching a threshold (index greater than -0.8). For countries where the control of corruption is stronger (for instance United States, see Figure 2.3), it leads to much larger impacts of per capita income growth on the income of the poor than in countries where corruption is more prevalent (for instance Bangladesh, see Figure 2.4). Countries with control of corruption very close to the threshold point include Albania, Belarus and Georgia.

The second PSTR model (ii) with  $r = 1$  is written as follows:

$$\ln y_{it} = u_i + \lambda_t + \beta_0 X_{it-1} + \beta_1 Gov_{it-1} g(\ln GDPpc_{it-1}, \gamma, \delta) + \varepsilon_{it} \quad (2.7)$$

where the logistic transition function is:

$$g(\ln GDPpc_{it-1}, \gamma, \delta) = [1 + \exp[-\gamma(\ln GDPpc_{it-1} - \delta)]]^{-1}, \gamma > 0 \quad (2.8)$$

$X_{it-1}$  is a vector of control variables as in model (i).

Additionally, equation (2.7) allows the marginal effect of governance on the income of the poor to depend on the level of development and is given by:

$$e_{it} = \frac{\partial \ln y_{it}}{\partial Gov_{it-1}} = \beta_0 + \beta_1 g(\ln GDPpc_{it-1}, \gamma, \delta) \quad (2.9)$$

The properties of equation (2.8) remain the same as in the first step.

The results presented in Table 2.9 suggest no evidence of nonlinearity regarding the effects of governance on the income of the poor as a function of the level of development. These findings contrast with previous results, which show that the impact of good governance on the income of the poor is greater in countries with high development levels.

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<sup>16</sup> The transition function depends upon the governance indicator: control of corruption.

**Table 2.9. Results of linearity for the PSTR models (i) and (ii)**

Threshold variables	Control of corruption	Level of Development
N° of transition function ( $r^*$ )	1	1
( $H_0: r=0$ vs $H_1: r=1$ )		
LRT Test of linearity	26.357 (0.000)	0.000 (0.993)
Wald Test	23.387 (0.001)	0.000 (0.993)
Fisher Test	2.567 (0.021)	0.000 (0.994)
( $H_0: r=1$ vs $H_1: r=2$ )		
LRT Test of no remaining nonlinearity	3.614 (0.823)	0.276 (0.599)
Wald Test	3.554 (0.829)	0.276 (0.559)
Fisher Test	0.248 (0.971)	0.179 (0.673)
Number of observations	360	360
Number of countries	36	36

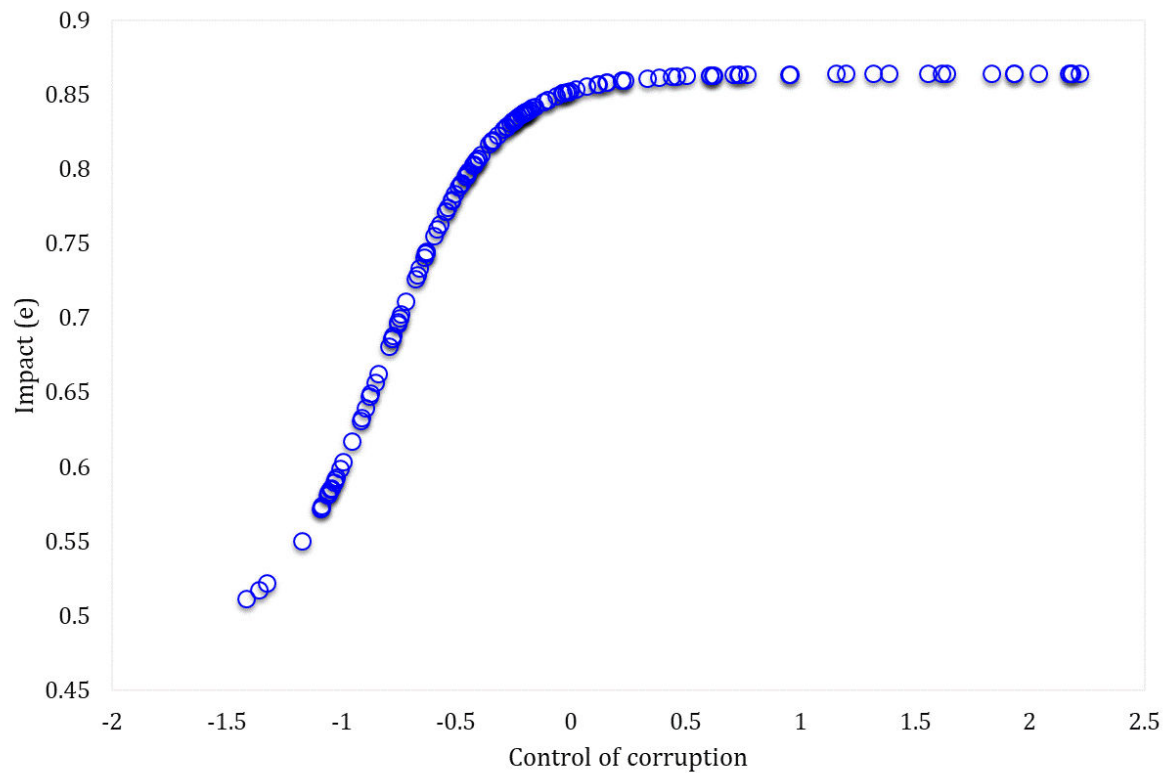
Note: The test of linearity has an asymptotic  $F(1, TN-N-1)$  distribution under the null hypothesis and  $F(1, TN-N-2)$  for the no remaining nonlinearity test with  $N$  the number of individuals and  $T$  the number of periods. For statistics, the p-values are in parentheses. As the PSTR is also a fixed effect model, the PSTR package requires at least two lines with no missing values for all dependent, explanatory and threshold variables. These models keep only countries for which there are at least three lines with no missing values for the variables used. 36 countries meet these criteria.

**Table 2.10. Parameter estimates for the PSTR model (i)**

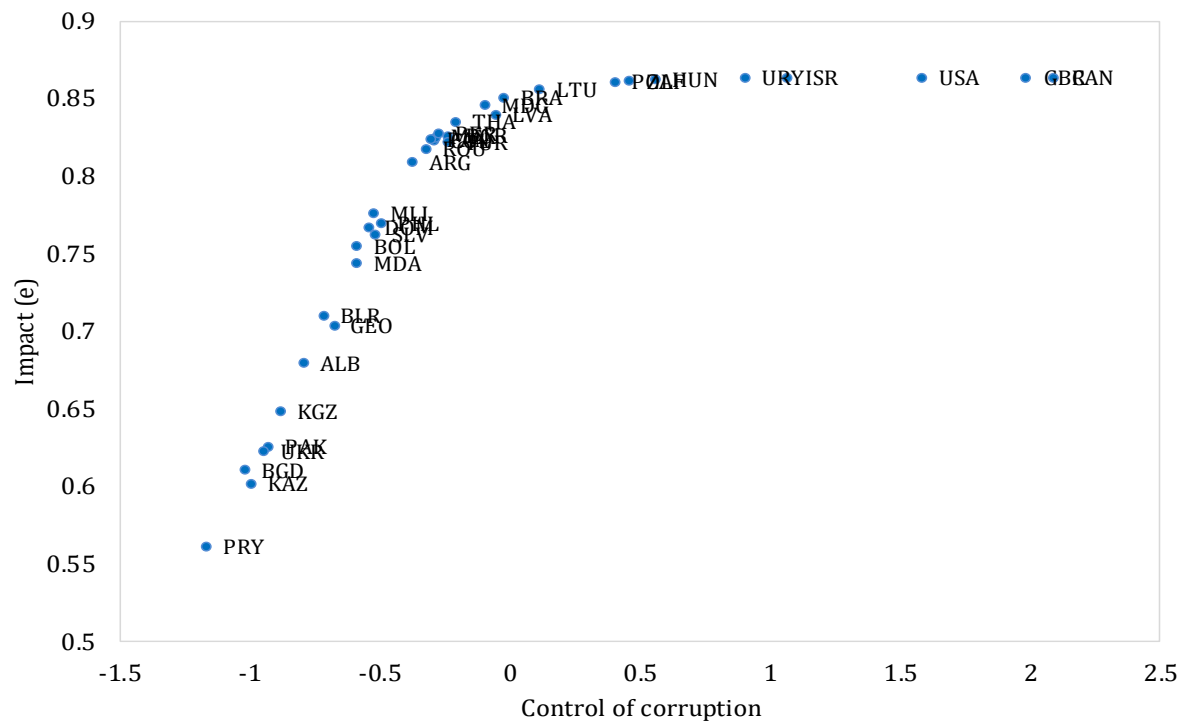
Dependent variable: Log of income of the poorest 20 percent		
	Coefficient	t-statistic
Log of GDP per capita $t-1$	0.4848	2.55426765
Log of GDP per capita $t-1$ *g	0.3793	2.016480595
SpendingEdu $t-1$	-0.05418	-1.208296164
M2 $t-1$	0.0006608	0.2543495
Inflation $t-1$	-0.001737	-3.581443299
Sanitation $t-1$	0.01925	1.556184317
Openness $t-1$	0.002967	1.229080365
FinOpenness $t-1$	0.01546	0.561773256
Location parameter	-0.811	
Smooth parameter	4.224	
Number of observations	144	
Number of countries	36	

Note: g is the transition function and depends on the threshold variable: control of corruption, the location and smooth parameters.

**Figure 2.3. Marginal impact of income growth on the income of the poor**



**Figure 2.4. Average estimated impact of income growth on the income of the poor**



### 2.6.2.2. Estimation of Models (iii) and (iv)

This section tests the nonlinear relationship between: (iii) government effectiveness and the income share of the poorest 20 percent as a function of the level of development (equation 2.10) and (iv) growth and the income share of the poorest 20 percent as a function of the level of government effectiveness (equation 2.11).

$$\ln Q_{it} = u_i + \lambda_t + \beta_0 X_{it-1} + \beta_1 \ln GDPpc_{it-1} g(Gov_{it-1}, \gamma, \delta) + \varepsilon_{it} \quad (2.10)$$

$$\ln Q_{it} = u_i + \lambda_t + \beta_0 X_{it-1} + \beta_1 Gov_{it-1} g(\ln GDPpc_{it-1}, \gamma, \delta) + \varepsilon_{it}, \quad (2.11)$$

where  $\ln Q_{it}$  denotes the logarithm of income share of the 20 percent poorest;  $X_{it-1}$  represents a vector of control variables including secondary school enrolment, inflation, improvement in sanitation, trade openness, financial openness and unemployment rate at time  $t - 1$ ;  $Gov_{it-1}$  represents the governance indicator, government effectiveness at time  $t - 1$ ;  $\ln GDPpc_{it-1}$  is the logarithm of the GDP per capita;  $u_i$  is an individual fixed effect; and  $\varepsilon_{it}$  stands for the idiosyncratic error.<sup>17</sup>

The results in Table 2.11 show no evidence of nonlinearity considering either the impact of growth on the income share of the poorest 20 percent as a function of government effectiveness or the effect of government effectiveness on the income share of the poorest 20 percent depending on the level of development.

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<sup>17</sup> The chapter retains government effectiveness because this is the main significant variable in the inclusive growth regressions.



**Table 2.11. Results of linearity for the PSTR models (iii) and (iv)**

Threshold variables	Government Effectiveness	Level of Development
N° of transition function ( $r^*$ )	1	1
( $H_0: r=0$ vs $H_1: r=1$ )		
LRT Test of linearity	2.195 (0.143)	2.750 (0.102)
Wald Test	2.710 (0.141)	2.711 (0.100)
Fisher Test	1.457 (0.232)	1.831 (0.181)
( $H_0: r=1$ vs $H_1: r=2$ )		
LRT Test of no remaining nonlinearity	0.061 (0.804)	0.152 (0.696)
Wald Test	0.061 (0.804)	0.152 (0.696)
Fisher Test	0.039 (0.844)	0.097 (0.757)
Number of observations	320	320
Number of countries	32	32

Note: The test of linearity has an asymptotic  $F(1, TN-N-1)$  distribution under the null hypothesis and  $F(1, TN-N-2)$  for the no remaining nonlinearity test with  $N$  the number of individuals and  $T$  the number of periods. For statistics, the p-values are in parentheses. As the PSTR is also a fixed effect model, the PSTR package requires at least two lines with no missing values for all dependent, explanatory and threshold variables. These models keep only countries for which there are at least three lines with no missing values for the variables used. 32 countries meet these criteria.

## 2.7. Conclusion and discussion

This chapter examines, first, the extent to which growth has been pro-poor and inclusive by assessing, respectively, the impacts of income growth on poverty reduction and on the bottom share of the income distribution. Second, it investigates the effects of good governance in reducing poverty and attaining inclusive growth and assesses the factors that have been driving these outcomes. Third, the chapter tests the nonlinear impacts of growth on poverty and inclusion.

Using a sample of 112 countries over 1975–2012, the chapter finds that growth is generally pro-poor. Incomes of the poorest 20 percent rise, while the poverty headcount ratio at \$2-a-day decreases with mean per capita incomes as economic growth proceeds. But inequality reduces this effect. The chapter also finds that, globally, growth has not been inclusive. A striking finding is that the combination of political, economic, and institutional features of good governance improves the income of the poor and decreases poverty. The control of corruption and regulatory quality have the most positive impact on the incomes of the poor. However, only two features of governance (government effectiveness and the rule of law) have positive

and significant effects on inclusive growth because they increase the income share of the poorest 20 percent.

The results suggest that enhancing human capital through health care and education spending, infrastructure improvement, and financial development are the main factors positively influencing poverty reduction and inclusive growth. The results also suggest that programs such as fighting infant mortality and HIV/AIDS are pro-poor. Finally, using the PSTR approach, the study finds evidence of a nonlinear relationship on the impact of growth on poverty. The impact of growth on the incomes of the poor is an increasing function of the control of corruption. However, the impact of growth on inclusiveness is linear.

This chapter highlights that important elements in pro-poor and inclusive strategies include continued efforts to strengthen governance, control corruption, advance government effectiveness, and promote economic and social fairness. In addition, policies to attain pro-poor and inclusive growth need to be more broad-based by focusing on social development, including education, health care, infrastructure and financial development.

## Appendix A

**Table A1. Country list**

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Albania, Algeria, Argentina, Armenia, Australia, Azerbaijan, Bangladesh, Belarus, Belgium, Belize, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Central African Republic, Chile, China, Columbia, Costa Rica, Cote d'Ivoire, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Arab Republic of Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, The Republic of Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Islamic Republic of Iran, Ireland, Israel, Italy, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lao PDR, Latvia, Lesotho, Lithuania, Luxembourg, Macedonia FYR, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mexico, Moldova, Montenegro, Mozambique, Namibia, Nepal, Netherlands, Nicaragua, Niger, Nigeria, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, South Africa, Swaziland, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Timor-Leste, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Republic of Yemen, Zambia.

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**Table A2. Description of variables**

Variable	Source	Description/Definition
Survey means	POVCALNET, LIS	POVCALNET measures welfare by income or consumption as determined in the surveys. Regarding LIS, DKK calculate survey means of disposable income directly from the micro survey data on household level.
lnyp	POVCALNET, LIS	Logarithm of Income of the poorest 20 percent of the income distribution
lnQ	POVCALNET, LIS	Logarithm of the share of the Income of the 20 percent of the income distribution
lnBot.40	POVCALNET, LIS	Logarithm of the share of the Income of the 40 percent of the income distribution
lnP	WDI, World Bank	Logarithm of Poverty headcount ratio at \$2 a day (PPP) in percentage of population
lnY	WDI, World Bank	Logarithm of GDP per capita based on purchasing power parity (PPP constant 2005 international dollar)
log of gini index	WDI, World Bank	Logarithm of GINI index. Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution
<i>Governance variables</i>		
Voice and accountability	WGI, World Bank	It reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of association and media. Estimate of governance range from approximately from -2.5 to 2.5 (strong performance)
Control of corruption	WGI, World Bank	It defines perceptions of the extent to which public power is exercised for private gain and captures the state by elites and private interests
Government Effectiveness	WGI, World Bank	It describes perceptions of the quality of public and civil services, the quality of policy design and implementation, and the reliability of the government's duty to such policies
Regulatory quality	WGI, World Bank	It defines perceptions of the capability of the government to formulate and realize sound policies and regulations
Rule of law	WGI, World Bank	It reflects insights of the extent to which agents have confidence in and accept the rules of society (property rights, the police, the courts, the quality of contract implementation)
Political Stability and absence of violence	WGI, World Bank	It defines perceptions of the likelihood that the government will be destabilized or defeated by unconstitutional or violent processes, including terrorism and politically-motivated violence
<i>Structural factors</i>		
HegdP	WDI, World Bank	Public health expenditure (% GDP). It consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds
Mortality5	WDI, World Bank	Under-five mortality rate per 1,000 live births is the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates
pVIH	WDI, World Bank	Prevalence of HIV refers to the percentage of people ages 15-49 who are infected with HIV
SpendingEdu	WDI, World Bank	Public expenditure on education as % of GDP is the total public expenditure on education expressed as a percentage of the Gross Domestic Product (GDP) in a given year. Public expenditure on education includes government spending on educational institutions (both public and private), education administration, and transfers/subsidies for private entities (students/households and other private entities)
SchoolSec	WDI, World Bank	Gross enrolment ratio (GER). Secondary. All programs. Total is the total enrolment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age. GER can exceed 100% due to the inclusion of over-aged and under-aged students because of early or late school entrance and grade repetition
Sanitation	WDI, World Bank	Improved Sanitation (% of population with access). Access to an improved sanitation structure refers to the percentage of the population using an improved sanitation structure
Inflation	WDI, World Bank	Inflation, consumer prices (annual %) Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly
M2	WDI, World Bank	Money and quasi-money (M2) as % of GDP
Openness	WDI, World Bank	Trade openness is the sum of exports and imports of goods and services measured as a share of GDP
FinOpenness	WDI, World Bank	The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness. The index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restriction. Source: <a href="http://web.pdx.edu/~ito/kaopen_Chinn-Ito_hi0523.pdf">http://web.pdx.edu/~ito/kaopen_Chinn-Ito_hi0523.pdf</a>
Unemployment	WDI, World Bank	Unemployment, total (% of total labor force) is the share of the labor

**Table A3. Descriptive statistics of main variables**

Variables	Mean	Standard Deviation		Max		Min		Number of Observations	Number of Countries
		Between	Within	Between	Within	Between	Within		
Log of income of the poorest 20 percent	6.71	1.46	0.27	9.89	7.79	4.3	5.67	531	112
Log of poverty									
Headcount ratio	2.75	1.73	0.63	4.55	5.39	-2.78	-1.49	434	92
Log of GDP per capita	8.47	1.17	0.25	10.79	9.79	6.21	7.15	944	112
Log of Gini index	3.68	0.23	0.09	4.23	4.09	3.16	3.31	456	112
Control of corruption	-0.05	0.97	0.17	2.43	0.7	-1.18	-0.69	557	112
Government Effectiveness	0.01	0.93	0.15	2.12	0.79	-1.44	-0.57	557	112
Political Stability	-0.16	0.84	0.27	1.48	1.07	-1.94	-1.39	557	112
Regulatory quality	0.06	0.87	0.18	1.81	1.06	-1.97	-0.55	557	112
Rule of law	-0.1	0.94	0.15	1.93	0.54	-1.47	-0.83	557	112
Voice and Accountability	-0.01	0.89	0.17	1.6	0.49	-1.9	-1.09	557	112

**Table A4. Correlations between explanatory variables and lagged and differenced instruments used in the SYS-GMM estimation.<sup>18</sup>**

Variables	Log of GDP per capita	Log of Gini index	Lag_1(Log of GDP per capita)	Lag_1(Log of Gini index)	Diff (Log of GDP per capita)	Diff (Log of Gini index)
Log of GDP per capita	1					
Log of Gini index	0.06	1				
Lag_1 (Log of GDP per capita)	0.98	0.07	1			
Lag_1 (Log of Gini index)	0.03	0.89	0.02	1		
Diff (Log of GDP per capita)	0.08	-0.05	-0.07	0.07	1	
Diff (Log of Gini index)	0.03	0.03	0.08	-0.41	-0.28	1

Note: if correlations are small, instruments are weakly correlated with the offending explanatory variable, thus instruments are poor predictors of the of the endogenous predictor. In this case, lagged variables of log of GDP per capita and of log of Gini are good instruments, but variables in in difference are are a little weak because correlations are smaller than 0.1.

<sup>18</sup> Table A4 presents correlations for Table 2.1 (Benchmark results) in which the chapter uses only lag 1 as instruments. Table 2.1 (Benchmark results) in which the chapter uses only lag 1 as instruments.

**Table A5. Governance indicators and pro-poor growth regressions**

Variables	(1) lnP	(2) lnP	(3) lnP	(4) lnP	(5) lnP	(6) lnP	(7) lnP
Log of GDP per capita	-1.29*** (0.27)	-1.76*** (0.29)	-1.58*** (0.29)	-1.51*** (0.18)	-1.17*** (0.25)	-1.81*** (0.27)	-1.55*** (0.2)
Log of Gini Index	2.99*** (0.78)	2.63*** (0.71)	3.06*** (0.7)	2.28** (0.7)	3.59*** (0.68)	2.66*** (0.64)	2.75*** (0.68)
Governance	-0.3* (0.16)						
Control of corrup		-0.1 (0.35)					
Gov. Effectiveness			-0.007 (0.35)				
Political Stability				-0.31** (0.15)			
Regulatory quality					-0.44* (0.25)		
Rule of law						0.14 (0.32)	
Voice and Account.							-0.4* (0.23)
Constant	2.15 (0.58)	7.46* (3.84)	4.45 (3.55)	6.60** (3.17)	-0.9 (2.85)	7.9** (3.17)	5.22* (3.13)
Observations	284	284	284	284	284	284	284
AR(1) test	0.1	0.24	0.23	0.2	0.22	0.3	0.12
AR(2) test	0.03	0.01	0.01	0.04	0.06	0.02	0.01
P-Value Hansen test	0.22	0.15	0.21	0.10	0.08	0.38	0.24
Number of countries	90	90	90	90	90	90	90
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Note: Robust standard errors in parentheses:\*\*\* p<0.01,\*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.

**Table A6. Shared prosperity and structural variables**

Variables	(1) lnBot.40	(2) lnBot.40	(3) lnBot.40	(4) lnBot.40	(5) lnBot.40	(6) lnBot.40
Log of GDP per capita	-0.01 (0.06)	-0.16** (0.07)	-0.24** (0.09)	-0.19*** (0.07)	-0.31*** (0.1)	-0.35*** (0.1)
Gov. Effectiveness	0.14* (0.08)	0.12* (0.07)	0.19** (0.08)	0.02 (0.06)	0.16** (0.07)	0.15** (0.07)
Spending in Education	0.02 (0.03)	0.00 (0.02)	-0.00 (0.02)			
SchoolSec				0.007*** (0.002)	0.004** (0.003)	0.001 (0.002)
FinOpenness	-0.04 (0.03)	-0.04 (0.02)	-0.03 (0.03)	-0.01 (0.03)	-0.06 (0.05)	-0.00 (0.03)
Openness	0.003** (0.001)	0.00 (0.001)	0.002** (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Inflation	0.00* (0.00)	0.00 (0.00)	-0.03 (0.00)	0.00 (0.00)	0.003 (0.002)	0.001 (0.00)
M2	-0.00 (0.00)	-0.00 (0.001)	-0.001* (0.001)	0.00 (0.00)	0.00 (0.00)	0.00 (0.001)
Sanitation		0.006*** (0.002)	0.007** (0.003)		0.006** (0.003)	0.008** (0.003)
Unemployment			-0.00 (0.00)			-0.005 (0.007)
Health/GDP			0.00 (0.02)			0.02 (0.02)
Constant	-2.03*** (0.51)	-1.01* (0.58)	-0.33 (0.69)	-0.89* (0.53)	-0.15 (0.78)	0.26 (0.74)
Observations	274	269	226	277	272	231
AR(1) test	0.17	0.32	0.31	0.63	0.49	0.99
AR(2) test	0.8	0.31	0.25	0.44	0.67	0.18
P-Value Hansen test	0.55	0.72	0.86	0.22	0.03	0.94
Number of countries	99	98	88	100	99	88
Model	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM

Notes: The dependent variable is the share of the bottom 40 percent in the income distribution, in logarithm.

Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Diagnostic tests (Hansen and first and second-order autocorrelations) reveal no evidence against the validity of the instruments used by the SYS-GMM estimator.





# Chapter 3 Reallocating Public Spending to Reduce Income Inequality: Can it work?

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**Abstract:** Can a government reduce income inequality by changing the composition of public spending while keeping the total level fixed? This question is of particular relevance given the everlasting financing constraint most governments face, either because of already high public spending, elevated public debt, limited domestic resources, or the combination of the three. This chapter examines the effects of public spending reallocations on income inequality. Using a newly assembled data on disaggregated public spending for 83 countries across all income groups, it shows that reallocating spending towards social protection and infrastructure is associated with reduced income inequality, particularly when it is financed through cuts in defense spending. However, the political and security environment matters. The chapter does not find evidence that lowering defense spending to finance infrastructure and social outlays improves income distribution in countries with weak institutions and higher risk of conflict. Reallocating social protection and infrastructure spending towards other type of spending tends to increase income inequality. Accounting for the long-term impact of health spending, and particularly education spending, helps to better capture their equalizing effects.

### **3.1. Introduction**

Rising income inequality is at the forefront of the economic policy debate around the world. Increases in income inequality in advanced and developing economies during the recent decades have been attributed to an array of factors, including skill-biased technological progress, technology diffusion, declining top marginal income tax rates, and the liberalization of factor and product markets (Woo et al., 2017). Evidence from public surveys in various countries indicates that widening income inequality has been accompanied by a growing public demand for income redistribution (IMF, 2015). What tools are at the disposal of governments for income redistribution?

A large and growing empirical literature identifies fiscal policy as a primary tool for governments to affect income distribution (IMF, 2015). In general, a more progressive taxation system is expected to have equalizing effects on income distribution (Woo and others, 2017). Direct taxes, in particular personal income tax and to a lesser extent corporate income tax, tend to improve income distribution while indirect taxes, including consumption taxes and custom duties, increase income inequality (Gemmell and Morrissey, 2005; Cubero and Hollar, 2010; Martinez-Vazquez et al., 2012). Many studies show that public spending, in particular in the form of social benefits, seems to have a higher redistributive impact than taxes (Martinez-Vazquez et al. 2012; Joumard et al. 2012; Paulus et al. 2009; Chu et al. 2004). A large body of literature analyzes the effects of government spending on income inequality. The recent survey by Anderson et al. (2017) identifies 84 studies containing over 900 estimations. Overall, the meta-analysis from the authors shows some evidence of a moderate negative relationship between government spending and income inequality, which is strongest for social welfare and other social spending.

This chapter focuses on the effects of public spending on income inequality.<sup>19</sup> Unlike previous papers in the empirical literature, which analyze the impact of various spending components on income inequality, this chapter innovates by focusing on the benefits of spending

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<sup>19</sup> Governments have various objectives when undertaking public spending, including raising per capita income and providing social services. Income inequality is only one of these objectives. This chapter focuses on the distributional impact of public spending composition because this important issue has not received due consideration in the literature.

reallocation. It assesses whether and how governments could reduce income inequality by changing the composition of public spending while keeping the total level fixed. This question is particularly important for various reasons. First, high public debt and limited fiscal space in many advanced economies seem set to remain a lasting legacy of the global economic and financial crisis. Second, in many advanced economies, particularly in Europe, already high spending levels combined with high taxation constrain the potential to address rising inequalities through additional spending increases. Third, many developing economies face significant challenges in realizing their tax revenue potential, limiting much-needed fiscal space for growth-enhancing and social spending. The lackluster performance in many developing countries tax revenue mobilization is a result of various factors, including high informality and limited institutional capacity, which appear difficult to overcome overnight. Given the constraints in raising taxes and increasing spending, reallocating public spending within a fixed overall envelope may provide a way out to tackle rising inequality. Can this work?

Using a newly assembled data on disaggregated public spending for 83 countries across all income groups, the results show that reallocating spending toward social protection and infrastructure is associated with lower income inequality, particularly when it is financed through cuts in defense spending. This result is only valid in countries with low risks of conflict and strong institutions. In countries with high risk of conflict and weak institutions, the chapter does not find evidence that cutting defense spending to finance infrastructure and social protection outlays improves income distribution. Accounting for the long-term impact of health spending and in particular education spending helps to better capture their impact on inequality. After accounting for the long-term impact, financing higher health spending and in particular education spending through cuts in defense spending is also associated with lowered income inequality. Reallocating social protection and infrastructure spending towards other types of spending tends to increase income inequality. Additional robustness checks to account for (i) alternative measures of income inequality; (ii) spending of local governments; (iii) the efficiency of public spending; (iv) the impact of debt-financed public spending; and (v) the potential differences between advanced and emerging economies confirm the main results.

The rest of the chapter is organized as follows. Section 3.2 describes the new dataset on the composition of public spending and discusses few stylized facts on public spending and income

inequality. Section 3.3 presents the empirical strategy and discusses the results. Section 3.4 discusses robustness checks. The last section provides some concluding remarks.

## **3.2. Data**

### **3.2.1. Composition of public spending: A new dataset**

The chapter uses a newly assembled disaggregated dataset on public spending composition by Acosta-Ormaechea and Morozumi (2017). The dataset relies on the International Monetary Fund (IMF)'s Government Finance Statistics Yearbook, which presents public expenditure according to an economic and a functional classification. This chapter focuses on the functional classification, which is more relevant for our empirical question.<sup>20</sup> Between mid-1990s and early 2000s, the IMF introduced a new classification for its government finance statistics, the 2001 Government Finance Statistics Manual (GFSM2001).<sup>21</sup> Categories of spending under this new classification are not fully comparable with the previous classification, the 1986 Government Finance Statistics Manual (GFSM1986) for various reasons. First, GFSM1986 classifies government spending into 14 categories while GFSM2001 has only 10 categories. Second, GFSM1986 reporting is only on a cash basis while GFSM2001 reporting is mainly on accrual basis.<sup>22</sup> More importantly, under GFSM2001, some countries combine the two accounting principles for different spending subcategories within a single year. These have been perennial challenges in the construction of long series on spending composition. Acosta-Ormaechea and Morozumi (2017) bridge the methodological changes associated with the introduction of the GFSM2001 to create consistent and comparable spending series from 1970 to 2011.

Because of limited data availability for some spending categories, the new dataset does not cover all 10 spending components present in GFSM2001. The dataset focuses on the main expenditure categories identified in the literature and comprises the following five

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<sup>20</sup> Much less data is available under the economic classification (wages, subsidies, social benefits, and capital spending), reducing drastically the size of the sample for an empirical study.

<sup>21</sup> The year of introduction of GFSM2001 differs by country.

<sup>22</sup> Accrual flows are recorded when transactions accrue, regardless of the time of payment while cash accounting records transactions when payments are made.

components: defense, transport and communication, health, education, and social protection.<sup>23</sup> The dataset covers consolidated spending at the central government level. In the rest of the chapter we will refer to transport and communication as our proxy for infrastructure spending.

### **3.2.2. Some Stylized Facts on Public Spending and Income Distribution**

Figure 3.1 describes the evolution of spending composition. Over the period 2000-2010, advanced and developing economies experienced a decline in the share of infrastructure and defense spending while share of health spending increased in both groups. The share of social protection spending remained flat in advanced economies but increased in developing countries.

The chapter uses the Gini coefficient from the Standardized World Income Inequality Database (SWIID). This dataset has the advantage of maximizing comparability of income inequality data while preserving the broadest possible coverage across countries and over time. The chapter focuses mainly on the net Gini, which captures inequality in disposable income (post-tax and post-transfer).<sup>24</sup>

An initial look at the data suggests a slight negative correlation between progressive taxation and the Gini coefficients. Overall, higher public spending seems associated with lower income inequality. Looking at the composition of spending, only social protection spending seems associated with lower income inequality while higher defense spending seems associated with increased income inequality (Figure 3.2).

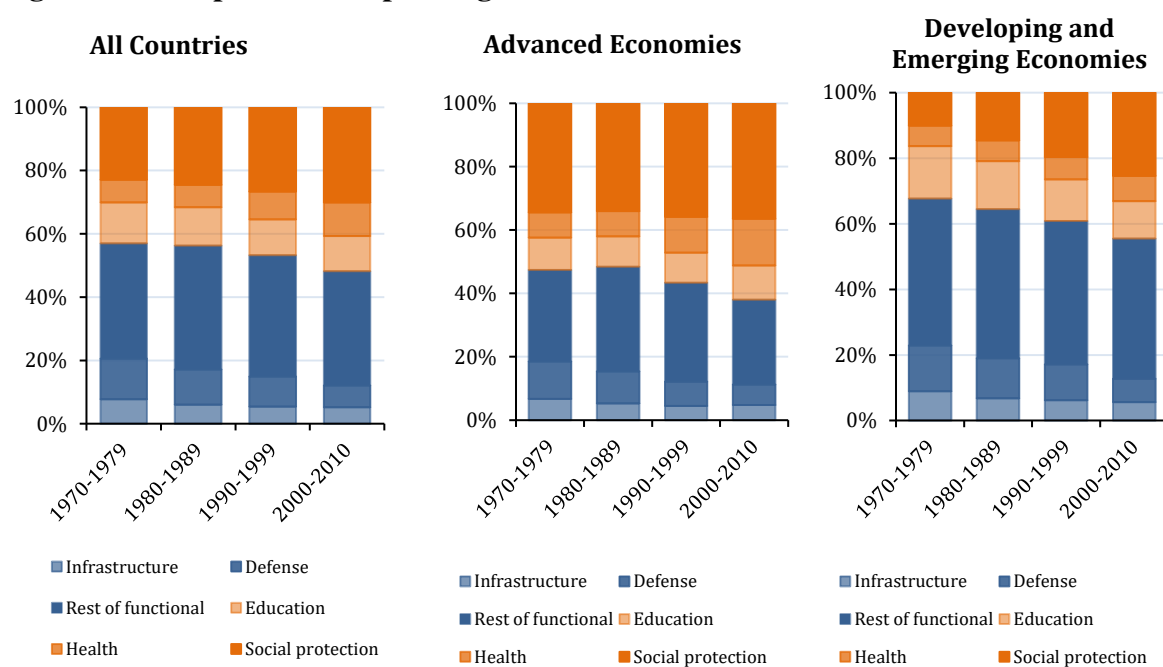
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<sup>23</sup> The remaining components include general public services, housing, fuel and energy, public order and safety and environmental protection.

<sup>24</sup> In the robustness check section (section 3.4) the chapter uses alternative measures of income inequality such as inequality in market income (pre-tax, pre-transfer) from SWIID; Gini coefficients from the Luxembourg Income Study (LIS); and top and bottom income share indicators from the World Bank's PovcalNet.

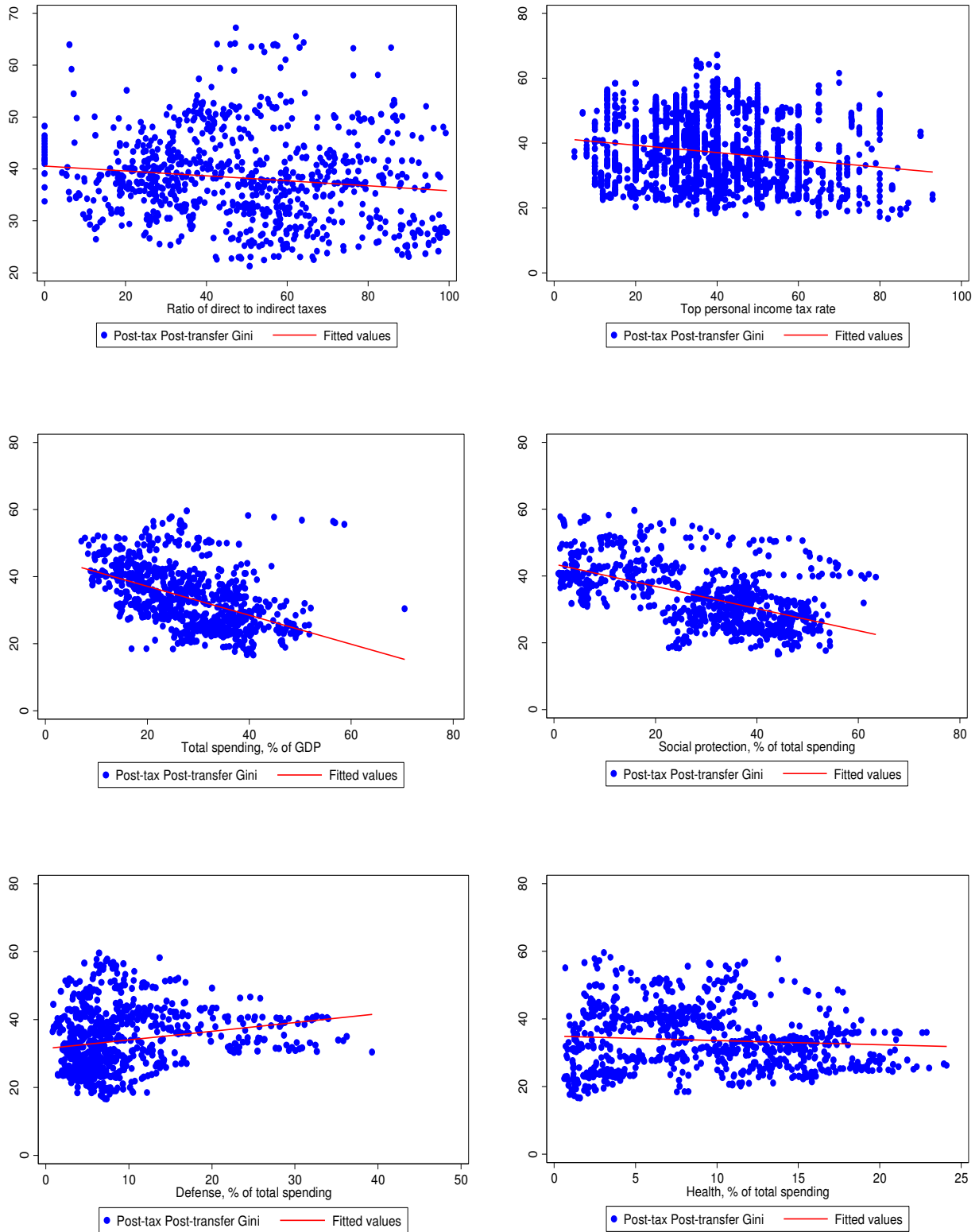
The chapter will also test the robustness of the main results to the use of general government data.

**Figure 3.1. Composition of Spending: Functional classification**



Source: Calculations based on Government Finance Statistics Yearbook (GFSY) database.

**Figure 3.2. Progressive Taxation, Public Spending, and Income Inequality**





### 3.3. Econometric Analysis: Composition of Public Spending and Income Inequality

#### 3.3.1. Estimated Model

The analysis builds on the large empirical literature on the determinants of income inequality, which finds that income per capita, education, trade openness, and technological change are the main determinants of cross-country variations in income inequality (e.g., Barro, 2008; Woo et al., 2017). While controlling for standard explanatory variables, the chapter innovates by assessing the effects of spending reallocation on income inequality.

The baseline regression specification is formally as follows:

$$\text{Log}(I_{it}) = \sum_{j=1}^n \delta_j S_{i,j,t-1} + \beta E_{i,t-1} + \gamma Z_{it-1} + v_i + \eta_t + \varepsilon_{it} \quad (3.1)$$

where  $\text{Log}(I_{it})$  denotes the logarithm of disposable income Gini coefficient for country  $i$  and year  $t$ .  $S_{i,j,t-1}$  captures the share of public spending component  $j$  in total spending.  $E_{i,t-1}$  represents the ratio of total spending in percent of GDP. Introducing this variable allows us to isolate the effects of spending composition (Devarajan, Swaroop, and Zou, 1996).  $Z_{it-1}$  is a vector of control variables. The chapter takes the one-year lag of all explanatory variables to reduce the risk of reverse causation.  $v_i$  denotes the country-specific fixed effects (to control for country-specific factors including the time-invariant component of the institutional environment);  $\eta_t$  designates the time-fixed effect (to control for global factors); and  $\varepsilon_{it}$  is an error term. By construction  $\sum_{j=1}^n \delta_j S_{i,j,t-1} = 1$ . This implies that including all spending components in one regression leads to perfect multicollinearity.

Similarly to Acosta-Ormaechea and Morozumi (2017), this chapter omits one spending component from the empirical equation to estimate it. Assuming that we omit component  $c$  from the empirical equation, the specification excludes  $S_{i,c,t-1}$  and becomes:

$$\text{Log}(I_{it}) = \sum_{j=1}^{n-1} (\delta_j - \delta_c) S_{i,j,t-1} + \beta E_{i,t-1} + \gamma Z_{it-1} + \delta_c + v_i + \eta_t + \varepsilon_{it} \quad (3.2)$$

The marginal effect of  $S_{i,j,t-1}$  is thus given by  $\frac{\partial \text{Log}(lit)}{\partial S_{i,j,t-1}} = (\delta_j - \delta_c)$ . It reflects the difference of marginal effects of spending components  $j$  and  $c$  and captures the marginal effect on income inequality of spending reallocation from component  $c$  to component  $j$ . We will refer to spending component  $c$  as the financing component.

The chapter's main approach to estimate the panel regression uses the fixed-effects (FE) panel regression, with Driscoll-Kraay standard errors, which are robust to very general forms of cross-sectional and temporal dependence. The error structure is assumed to be heteroskedastic, autocorrelated up to one lag (to account for the persistence of income inequality), and correlated between the panels (i.e., countries) possibly due to common shocks, such as international trade.

Table B1 (appendix) describes all the data used in the regressions.

This section briefly discusses the theoretical and expected impact of each variable included in our empirical model.  $Z_{it-1}$ , the vector of control variables includes:<sup>25</sup>

- **Income per capita** captured by the logarithm of per capita GDP and its squared term to capture a potential Kuznets curve hypothesis. Under the Kuznets curve hypothesis, inequality is expected to exhibit an inverted U-curve as an economy develops: in the initial stage of development, the structural transformation which implies shifts from agriculture to industry and services and adoption of new technologies benefits only a small segment of the population, leading to a rise of inequality. Overtime, a larger share of the population, and eventually the majority finds employment in the high-income sector, leading to a decline in income inequality. The existing evidence for the inequality Kuznets curve is however mixed (see Woo et al., 2017; Barro 2008; Kanbur 2000).
- **Human capital** is an index for education based on the average years of schooling from Barro and Lee (2013), which is interpolated for annual data and adjusted to account for higher returns to education for earlier years (Inklaar and Timmer, 2013). The theoretical relationship between education and income inequality remains ambiguous

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<sup>25</sup> These control variables are in line with those used in the empirical literature (Woo et al., 2017).

- because of two possible conflicting effects (Knight and Sabot 1983): (i) the “composition” effect, which predicts inequality to rise initially as the relative size of the educated population increases from a small base and subsequently decline as the share of educated group expands; (ii) the “wage compression” effect, which predicts a decline of education premium as the relative supply of educated workers increases, thereby decreasing income inequality. The human capital index used in this chapter puts a larger weight on basic education, which is more widespread across countries, and as such one expects a negative relationship between this index and income inequality, consistently with many studies in the literature (De Gregorio and Lee, 2002; Woo et al., 2017).
- **Trade openness**, captured by the sum of exports and imports over GDP, is a proxy for globalization. The standard international trade theory predicts that the impact of trade openness on income inequality would depend on countries’ relative factor endowments: developed countries, which enjoy a relatively larger endowment in capital (and relative labor scarcity) would experience a rise in the relative return to capital and greater income inequality.<sup>26</sup> In contrast, developing countries, which enjoy a relatively larger endowment in labor (and relative capital scarcity) would experience lower income inequality (Stolper and Samuelson, 1941). While a number of papers show that trade openness tends to be associated with lower income inequality (IMF, 2007; Woo and others, 2017), overall the literature has been inconclusive (Krugman, 2008; Meschi and Vivarelli, 2007). Extensions of the theoretical predictions suggest increased competition (Birdsall, 1998), incentives to up-skill (Blanchard and Giavazzi, 2003), and specialization (Francois and Nelson, 2003) as possible channels through which trade could reduce income inequality.

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<sup>26</sup> While trade openness is expected to exert downward pressure on the wage of low-skilled workers and increases inequality in advanced economies, trade openness could have a positive impact on investment and growth. By improving overall income, higher growth may enable low-skilled workers to upgrade their skills and invest in entrepreneurial activities, improving income distribution over the longer term.

- **Technological progress** measured by the share of information technology capital in the total capital stock is a proxy for skill-biased technological progress (Jorgenson and Vu, 2011). Most of the literature has identified skill-biased technological progress as one of the main drivers of rising income inequality over the recent decades (Autor et al., 1998; Acemoglu, 2003; IMF, 2007).
- **Unemployment** captured by the unemployment rate is expected to be associated with greater income inequality as a greater share of unemployed and inactive workers tend to be present in the bottom quintile of the income distribution (Martinez et al., 2001).
- **Inflation** measured by the change of consumer price index tends to disproportionately hurt the poor compared to other income groups and worsen inequality through various channels. The fraction of household wealth held in liquid assets, such as currency, decreases with income and wealth, leading to a transfer of wealth from the poorest to the richest through inflation and an increase of inequality (Erosa and Ventura, 2002; Albanesi, 2007). As wages tend to lag inflation, the latter could lead to a shift of income from wage earners to profit makers and an increase of income inequality (Laidler and Parkin, 1975; Fischer and Modigliani, 1978).
- **Public spending** captured by total spending in percent of GDP is a proxy for the size of the government. Because larger governments tend to be associated with larger distributional policies, including larger in-kind benefits, a high public spending would be associated with lower income inequality (Fournier and Johansson, 2016). While the size of the government is a public-choice issue, its composition is more subject to policy discussion and changes. The empirical literature also emphasizes that what matters more for the distributional impact of fiscal policy is its composition (Clements and others, 2015). The next section discusses the potential impact of various categories of spending.

Our variables of interest,  $S_{i,j}$  capture the share of public spending component  $j$  in total spending and comprise the following:

- **Defense spending.** Military spending may impact income inequality through various channels. First, by competing for scarce resources with other social entitlements, higher military spending could come at the expense of social programs deemed more

equalizing and lead to an increase of income inequality (Ali, 2004). Second, because of high wages in the high-skilled defense-related industries, a rise in defense spending would put pressure on wages in this sector, aggravating the wage gap with other industries and increase income inequality (Ali, 2007; Meng et al., 2015).<sup>27</sup>

- **Infrastructure spending.** By expanding geographic access, improving transportation opportunities, and easing information flow, infrastructure development enhances labor mobility. It can help disadvantaged individuals gain access to productive opportunities by connecting them to core economic activities (Calderon and Serven, 2004; Fan and Zhang, 2004). However, better endowed locations (in terms of human and private capitals) may have higher returns on infrastructure spending because of its complementarity with private capital, leading to a widening of income and wealth gaps. Evidence from the literature on the impact of infrastructure on income inequality is sparse and largely inconclusive (Chatterjee and Turnovsky, 2012; Mendoza, 2017).<sup>28</sup>
- **Education spending** Higher public spending in education has been long favored with the expectation that expanding access to education enhances upward social mobility by making lower income individuals more productive and able to compete for higher paying jobs associated with higher degrees (Becker, 1964). Public intervention in the form of spending is particularly important when lower income individuals lack adequate access to credit, which may undermine their capacity to afford education. An expansion of the number of graduates also reduces the skill gap and the associated wage

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<sup>27</sup> The military also absorbs a sizeable low-skilled, low-wage labor force. To the extent that the increase in military spending leads to higher wages for the low-skilled, low-wage labor force, it may be associated with lower income inequality through a reduction of the wage gap (Ali, 2007; Meng et al., 2015).

<sup>28</sup> For instance, Mendoza (2017) shows that wastewater treatment, domestic waste management, public green spaces, water efficiency, and residential power efficiency infrastructures are negatively correlated with income inequality while increase in mass transit, water supply coverage and internet access infrastructures are positively correlated with income inequality.

gap, eventually making the income distribution more equal (Kuznets, 1955).<sup>29</sup> However, going as far back as Tanzi (1974), there has been also wide recognition that the difficulty to target regular education spending to the poor has made these spending less effective in reducing inequality. In some cases, they could actually worsen inequality. Among other reasons, the benefits of government spending, including education programs, are often captured by the urban middle class for political economy reasons, potentially worsening income inequality (Hausmann and Rigobon, 1993; Alesina, 1998; Schwartz and Ter-Minassian, 2000).

- **Health spending.** Similarly to education spending, health spending can enhance productivity through higher human capital accumulation (Grossman, 1972). Public intervention in this sector is also important to reduce gaps in access but similar targeting issues (as for education spending) may lead to a capture of the benefits of public health spending by the middle class, minimizing its impact on inequality or even worsening it (Alesina, 1998; Schwartz and Ter-Minassian, 2000).
- **Social protection spending.** Social protection spending includes housing benefits, family-related benefits, and unemployment benefits, which from their very nature are mostly aimed to support lower income or vulnerable individuals. As such, one should expect that social protection spending reduces income inequality, at least in the first round (Whiteford, 2008; Anderson et al. 2017). However, social protection spending can be associated with second-order effects by creating some disincentives to work and subsequently increasing market income inequality. For instance, family-related benefits are often expected to reduce the labor supply of second-earners and relatively generous unemployment benefits lower financial incentives to work and can cause unemployment traps (Niehues, 2010). In sum, we expect that social protection spending would reduce net income inequality but the impact on market income inequality is ambiguous.

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<sup>29</sup> The political economy argument sees the merits of education beyond earnings but also as a tool to boost citizens' participation in the democratic process and eventually influence policy choices (Ganimian and Solano Rocha, 2011).

### **3.3.2. Baseline Results**

The results show that overall, higher public spending is associated with lower inequality of disposable income. A one-percentage point increase in total spending to GDP ratio is associated with a decline of net income inequality by 0.8 to 1 percent (Table 3.1, columns 1-5). Social protection and infrastructure spending are associated with lower income inequality while it seems to be the opposite for defense and health spending. A 1 percentage point increase in social protection spending is associated with a reduction in the disposable income Gini coefficient by 0.3 percent (Table 3.1, columns 4 and 9). A 1 percentage point increase in infrastructure spending is associated with a decline of disposable income Gini coefficient by about 0.8 percent (Table 3.1, columns 3 and 8). On the other hand, a 1 percent increase in defense and health spending are associated with an increase in income inequality by 0.6 percent and 0.5 percent respectively (Columns 2 and 5).<sup>30</sup>

Reallocating spending towards social protection and infrastructure is associated with much lower income inequality, when it is financed through cuts in defense and health spending (Table 3.2 to Table 3.6). More specifically, a 1 percentage point increase in social spending financed by a corresponding cut in defense spending is associated with a 0.5 percent reduction in inequality. A 1 percentage point rise in infrastructure spending financed by a corresponding cut in defense spending is associated with a 0.9 percent reduction in inequality. The Gini coefficient is quite inelastic. To put our results in perspective, the Gini coefficient has increased by 5.6 percent per annum on average between 1970 and 2010 in our sample. That means that spending reallocation from defense towards social protection and infrastructure could have offset up to one fourth of the increase in the Gini coefficient.

Reducing education spending is associated with lower income inequality only when the available is used to finance higher infrastructure investment. Reallocating social protection and infrastructure spending towards other type of spending tend to increase income inequality.

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<sup>30</sup> The chapter also assesses for the possibility that improvements in human capital can be a channel through which higher education and health spending affect income inequality. The main results are robust to the exclusion of the human capital variable, not supporting the transmission channel hypothesis.

Consistent with most of the empirical literature, education and trade openness are significantly associated with lower inequality while technological progress, unemployment, and inflation are associated with increased income inequality. The signs of the coefficient seem to suggest an inverse U-shaped relationship between income per capita and inequality but the coefficients are not significant. Introducing an indicator to capture the progressivity of the tax system does not impact our main results but do suggest that progressive taxation is associated with lower income inequality, consistently with the literature.



**Table 3.1. Impact of Total Spending and Spending Components on Income Inequality**

	Dependent Variable: Log (Net Gini)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log(GDP per capita)t-1	0.00229 (0.0371)	-0.0124 (0.0334)	0.0131 (0.0360)	0.0103 (0.0370)	0.0133 (0.0345)	0.00467 (0.0420)	-0.0139 (0.0421)	0.0168 (0.0440)	0.0144 (0.0442)	0.0177 (0.0405)
Log(GDP per capita) <sup>2</sup> t-1	-0.00269 (0.00837)	0.000612 (0.00744)	-0.00596 (0.00843)	-0.00331 (0.00879)	-0.00435 (0.00830)	-0.00464 (0.00976)	-0.000208 (0.00949)	-0.00832 (0.0102)	-0.00552 (0.0104)	-0.00688 (0.00962)
Human capital t-1	-0.230*** (0.0218)	-0.265*** (0.0134)	-0.252*** (0.0124)	-0.221*** (0.0115)	-0.249*** (0.0148)	-0.230*** (0.0207)	-0.269*** (0.0146)	-0.261*** (0.0140)	-0.232*** (0.0156)	-0.256*** (0.0152)
Trade openness t-1	-0.000427*** (0.000116)	-0.000325*** (8.57e-05)	-0.000290*** (0.000103)	-0.000481*** (9.07e-05)	-0.000518*** (0.000117)	-0.000540*** (0.000115)	-0.000365*** (0.000104)	-0.000355*** (0.000111)	-0.000524*** (9.26e-05)	-0.000571*** (0.000102)
Technology t-1	0.0238*** (0.00513)	0.0219*** (0.00497)	0.0228*** (0.00514)	0.0237*** (0.00487)	0.0189*** (0.00619)	0.0290*** (0.00595)	0.0257*** (0.00671)	0.0274*** (0.00643)	0.0265*** (0.00593)	0.0241*** (0.00738)
Unemployment rate t-1	0.0118*** (0.00292)	0.0113*** (0.00263)	0.0100*** (0.00300)	0.0115*** (0.00334)	0.0120*** (0.00351)	0.0118*** (0.00324)	0.0112*** (0.00307)	0.00944*** (0.00328)	0.0109*** (0.00348)	0.0113*** (0.00365)
Inflation t-1	0.000107** (4.85e-05)	9.25e-05* (4.61e-05)	7.61e-05* (3.97e-05)	0.000101** (4.27e-05)	9.02e-05** (4.32e-05)	0.000149*** (2.84e-05)	0.000134*** (2.21e-05)	9.54e-05*** (2.09e-05)	0.000131*** (1.91e-05)	0.000128*** (2.02e-05)
Total expenditure t-1	-0.00983*** (0.000951)	-0.0103*** (0.00106)	-0.0103*** (0.000919)	-0.00858*** (0.00132)	-0.00845*** (0.00136)	-0.00929*** (0.00111)	-0.0102*** (0.00128)	-0.00977*** (0.00107)	-0.00829*** (0.00156)	-0.00819*** (0.00139)
Education spending t-1	0.00239 (0.00259)					0.00357 (0.00251)				
Health spending t-1		0.00653*** (0.00161)					0.00659*** (0.00177)			
Infrastructure t-1			-0.00767** (0.00353)					-0.00846** (0.00362)		
Social spending t-1				-0.00259*** (0.000806)					-0.00208** (0.000972)	
Defense spending t-1					0.00502** (0.00241)					0.00404* (0.00210)
Top PIT rate						-0.00158*** (0.000534)	-0.00122** (0.000454)	-0.00162*** (0.000523)	-0.00134*** (0.000470)	-0.00135** (0.000513)
Observations	607	607	607	607	607	576	576	576	576	576
R-squared	0.699	0.715	0.701	0.707	0.707	0.711	0.726	0.712	0.712	0.713
Number of groups	60	60	60	60	60	57	57	57	57	57

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3.2. Impact of Spending Components on Income Inequality – Financed by cut in Defense Spending**

	Dependent Variable: Log (Net Gini)			
	(1)	(2)	(3)	(4)
Log(GDP per capita)t-1	0.0130 (0.0357)	0.00948 (0.0369)	-0.00795 (0.0320)	0.0157 (0.0357)
Log(GDP per capita) <sup>2</sup> t-1	-0.00382 (0.00858)	-0.00368 (0.00850)	0.000150 (0.00744)	-0.00566 (0.00892)
Human capital t-1	-0.229*** (0.0153)	-0.238*** (0.0261)	-0.265*** (0.0150)	-0.250*** (0.0140)
Trade openness t-1	-0.000545*** (0.000112)	-0.000545*** (0.000145)	-0.000481*** (0.000113)	-0.000451*** (0.000155)
Technology t-1	0.0207*** (0.00660)	0.0194*** (0.00682)	0.0173*** (0.00607)	0.0191*** (0.00623)
Unemployment rate t-1	0.0119*** (0.00361)	0.0123*** (0.00326)	0.0121*** (0.00299)	0.0112*** (0.00366)
Inflation t-1	9.79e-05** (4.26e-05)	0.000100** (4.84e-05)	9.27e-05* (4.77e-05)	8.13e-05* (4.25e-05)
Total expenditure t-1	-0.00801*** (0.00139)	-0.00844*** (0.00137)	-0.00874*** (0.00142)	-0.00886*** (0.00147)
Social spending t-1	-0.00512** (0.00232)			
Other spending t-1	-0.00331 (0.00272)			
Education spending t-1		-0.00340 (0.00435)		
Other spending t-1		-0.00480* (0.00250)		
Health spending t-1			0.00143 (0.00228)	
Other spending t-1			-0.00530** (0.00236)	
Infrastructure t-1				-0.00928*** (0.00319)
Other spending t-1				-0.00443 (0.00262)
Observations	607	607	607	607
R-squared	0.710	0.707	0.725	0.708
Number of groups	60	60	60	60

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3.3. Impact of Spending Components on Income Inequality – Financed by cut in Education Spending**

	Dependent Variable: Log (Net Gini)		
	(1)	(2)	(3)
Log(GDP per capita)t-1	-0.0151 (0.0357)	0.00699 (0.0391)	0.00645 (0.0380)
Log(GDP per capita) <sup>2</sup> t-1	0.00107 (0.00776)	-0.00275 (0.00899)	-0.00484 (0.00860)
Human capital t-1	-0.255*** (0.0265)	-0.212*** (0.0197)	-0.231*** (0.0252)
Trade openness t-1	-0.000355*** (0.000124)	-0.000506*** (0.000117)	-0.000350** (0.000141)
Technology t-1	0.0222*** (0.00533)	0.0240*** (0.00507)	0.0234*** (0.00537)
Unemployment rate t-1	0.0115*** (0.00258)	0.0118*** (0.00317)	0.0106*** (0.00291)
Inflation t-1	0.000101* (5.24e-05)	0.000110** (4.89e-05)	9.44e-05* (4.83e-05)
Total expenditure t-1	-0.0102*** (0.00104)	-0.00857*** (0.00132)	-0.0102*** (0.000927)
Health spending t-1	0.00518 (0.00406)		
Other spending t-1	-0.00121 (0.00268)		
Social spending t-1		-0.00375 (0.00250)	
Other spending t-1		-0.00126 (0.00286)	
Infrastructure t-1			-0.0107*** (0.00168)
Other spending t-1			-0.00265 (0.00265)
Observations	607	607	607
R-squared	0.715	0.707	0.703
Number of groups	60	60	60

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3.4. Impact of Spending Components on Income Inequality – Financed by cut in Health Spending**

	Dependent Variable: Log (Net Gini)		
	(1)	(2)	(3)
Log(GDP per capita)t-1	-0.00960 (0.0349)	-0.0151 (0.0357)	-0.00816 (0.0338)
Log(GDP per capita) <sup>2</sup> t-1	0.000800 (0.00799)	0.00107 (0.00776)	-0.00185 (0.00753)
Human capital t-1	-0.239*** (0.0126)	-0.255*** (0.0265)	-0.270*** (0.0143)
Trade openness t-1	-0.000427*** (9.83e-05)	-0.000355*** (0.000124)	-0.000217* (0.000115)
Technology t-1	0.0225*** (0.00497)	0.0222*** (0.00533)	0.0212*** (0.00525)
Unemployment rate t-1	0.0115*** (0.00286)	0.0115*** (0.00258)	0.00963*** (0.00256)
Inflation t-1	0.000102** (4.65e-05)	0.000101* (5.24e-05)	7.44e-05* (4.34e-05)
Total expenditure t-1	-0.00906*** (0.00145)	-0.0102*** (0.00104)	-0.0108*** (0.00102)
Social spending t-1	-0.00849*** (0.00182)		
Other spending t-1	-0.00617*** (0.00167)		
Education spending t-1		-0.00518 (0.00406)	
Other spending t-1		-0.00639*** (0.00182)	
Infrastructure spending t-1			-0.0171*** (0.00474)
Other spending t-1			-0.00710*** (0.00164)
Observations	607	607	607
R-squared	0.723	0.715	0.722
Number of groups	60	60	60

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3.5. Impact of Spending Components on Income Inequality – Financed by cut in Social Spending**

	Dependent Variable: Log (Net Gini)		
	(1)	(2)	(3)
Log(GDP per capita)t-1	-0.00960 (0.0349)	0.00699 (0.0391)	0.0145 (0.0374)
Log(GDP per capita) <sup>2</sup> t-1	0.000800 (0.00799)	-0.00275 (0.00899)	-0.00529 (0.00899)
Human capital t-1	-0.239*** (0.0126)	-0.212*** (0.0197)	-0.224*** (0.0104)
Trade openness t-1	-0.000427*** (9.83e-05)	-0.000506*** (0.000117)	-0.000404*** (0.000109)
Technology t-1	0.0225*** (0.00497)	0.0240*** (0.00507)	0.0233*** (0.00504)
Unemployment rate t-1	0.0115*** (0.00286)	0.0118*** (0.00317)	0.0104*** (0.00325)
Inflation t-1	0.000102** (4.65e-05)	0.000110** (4.89e-05)	8.81e-05** (4.07e-05)
Total expenditure t-1	-0.00906*** (0.00145)	-0.00857*** (0.00132)	-0.00896*** (0.00127)
Health spending t-1	0.00849*** (0.00182)		
Other spending t-1	0.00232*** (0.000839)		
Education spending t-1		0.00375 (0.00250)	
Other spending t-1		0.00249** (0.000920)	
Infrastructure spending			-0.00444 (0.00318)
Other spending t-1			0.00250*** (0.000768)
Observations	607	607	607
R-squared	0.723	0.707	0.710
Number of groups	60	60	60

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3.6. Impact of Spending Components on Income Inequality – Financed by cut in Infrastructure Spending**

	Dependent Variable: Log (Net Gini)		
	(1)	(2)	(3)
Log(GDP per capita)t-1	-0.00816 (0.0338)	0.0145 (0.0374)	0.00645 (0.0380)
Log(GDP per capita) <sup>2</sup> t-1	-0.00185 (0.00753)	-0.00529 (0.00899)	-0.00484 (0.00860)
Human capital t-1	-0.270*** (0.0143)	-0.224*** (0.0104)	-0.231*** (0.0252)
Trade openness t-1	-0.000217* (0.000115)	-0.000404*** (0.000109)	-0.000350** (0.000141)
Technology t-1	0.0212*** (0.00525)	0.0233*** (0.00504)	0.0234*** (0.00537)
Unemployment rate t-1	0.00963*** (0.00256)	0.0104*** (0.00325)	0.0106*** (0.00291)
Inflation t-1	7.44e-05* (4.34e-05)	8.81e-05** (4.07e-05)	9.44e-05* (4.83e-05)
Total expenditure t-1	-0.0108*** (0.00102)	-0.00896*** (0.00127)	-0.0102*** (0.000927)
Health spending t-1	0.0171*** (0.00474)		
Other spending t-1	0.0101*** (0.00365)		
Social spending t-1		0.00444 (0.00318)	
Other spending t-1		0.00694** (0.00313)	
Education spending t-1			0.0107*** (0.00168)
Other spending t-1			0.00801** (0.00306)
Observations	607	607	607
R-squared	0.722	0.710	0.703
Number of groups	60	60	60

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 3.3.3. The Role of Conflict and Institutions

A key finding from the section above is that higher defense spending is associated with higher inequality and cutting defense spending to finance higher infrastructure and social outlays is associated with lower income inequality. This suggests that countries may be better off reallocating military expenditure to more equalizing social and infrastructure spending. Is this valid for all countries regardless of their political fragility and the quality of their institutions? Are countries with relatively fragile institutions and high risk of conflict still better off reallocating spending from defense to social protection and infrastructure?

To assess the above questions, we extend our empirical equation (equation 3.2) to include a variable capturing countries' quality of institutions or risk of conflict and its cross terms with our variable of interest (social or infrastructure spending financed through cut in defense spending). For this purpose, our empirical model becomes:

$$\begin{aligned} \text{Log}(I_{it}) = & \sum_{j=1}^{n-1} (\delta_j - \delta_c) S_{i,j,t-1} + \sum_{j=1}^{n-1} (\omega_j - \omega_c) S_{i,j,t-1} * G_{i,t-1} + \alpha G_{i,t-1} \\ & + \beta E_{i,t-1} + \gamma Z_{it-1} + \delta_c + v_i + \eta_t + \varepsilon_{it} \end{aligned} \quad (3.3)$$

where  $G_{i,t-1}$  represents our indicators of governance or risk of conflict. All other variables remain as in equation 1. The marginal effect of  $S_{i,j,t-1}$  is thus given in this case by  $\frac{\partial \text{Log}(I_{it})}{\partial S_{i,j,t-1}} = (\delta_j - \delta_c) + (\omega_j - \omega_c) G_{i,t-1}$ . As previously, this marginal effect captures the effect of spending reallocation to component  $j$  from component  $c$ , as a function of the quality of institutions or risk of conflict. In this section component  $j$  and  $c$  are respectively social and infrastructure spending (component  $j$ ) and defense spending (component  $c$ ).

We use six indicators from the International Country Risk Guide (ICRG) to capture political risk. These are bureaucracy quality; corruption, democratic accountability; external conflict, internal conflict; and law and order. A higher value for each indicator reflects a lower risk.<sup>31</sup>

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<sup>31</sup> (1) *Bureaucracy quality*, with a score between 0 and 4, captures the quality of the bureaucracy. In countries with highest risk (low score), a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions. (2) *Corruption*, with a score between 0 and 6, captures excessive issues such as patronage, nepotism, that can lead to a popular backlash, resulting in

Figures B1 to B3 (in the appendix) illustrate our results. Analyzing first the impact of cuts in defense spending regardless of the use of the released resources (Figure B1) highlights that reducing defense spending is associated with lower inequality only when institutions are strong and the risk of political instability is low. In countries with weak institutions and higher risks of conflict, defense spending does not appear dis-equalizing. Financing higher social and infrastructure spending through cuts in defense spending is associated with lower income inequality only in countries with the lowest risks of conflict and strong institutions (Figures B2 and B3). In countries with higher risks of conflict, the chapter does not find evidence that lowering defense spending to finance infrastructure and social outlays is equalizing. This finding may reflect the fact that conflicts and political instability tend to disproportionately hurt the poor and less fortunate (Bircan et al. 2010).<sup>32</sup>

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a fall or overthrow of the government, a major reorganizing or restructuring of the country's political institutions, or, at worst, a breakdown in law and order, rendering the country ungovernable. (3) *Democratic accountability*, with a score between 0 and 6, measures of how responsive the government is to its people. The lowest risk is assigned to alternating democracies, while the highest risk is assigned to autarchies. (4) *External conflict*, with a score between 0 and 12, assesses the risk to the incumbent government from foreign action, ranging from non-violent external pressure (diplomatic pressures, withholding of aid, trade restrictions, territorial disputes, sanctions, etc.) to violent external pressure (cross-border conflicts to all-out war). (5) *Internal conflict* assesses political violence, with a score ranging from 0 to 12. Countries embroiled in an on-going civil war have the highest risk while the government does not indulge in arbitrary violence against its people in countries with low risk. (6) *Law and order*, with a score between 0 and 6, assesses the strength and impartiality of the legal system and the popular observance of the law. Very high crime rate if the law is routinely ignored without effective sanction (for example, widespread illegal strikes) implies highest risks.

<sup>32</sup> The results are robust to the use of median values to separate countries with relatively strong institutions from others (appendix, Table B4).



### **3.4. Further Robustness Checks**

#### **3.4.1. Long-Run Impact of Public Spending**

The analysis so far has focused on the short-term impact of spending composition using annual data with one-year lags for the explanatory variables, to help reduce the risk of reverse causality. Various studies in the literature on the impact of public spending on income inequality argue that spending such as health and particularly education outlays may affect income inequality only after a fairly long time lag (Chu et al., 2000; Bastagli et al., 2012, 2015).

We account for the potential long-run impact of public spending by adopting a 10-year framework, which assesses the impact of public spending in  $t-1$ , as in the initial framework, on income inequality during the following 10 years ( $t$  to  $t+9$ ).<sup>33</sup> Formally, we replace our measure of inequality  $Log(I_{it})$  by the average level of inequality between  $t$  and  $t+9$  ( $\overline{Log(I)}_{i,t \text{ to } t+9}$ ).

The 10-year framework has many advantages. The first and most important one being its suitability to better capture the full effect of specific spending such as education outlays. The second advantage is a better robustness to reverse causality as it is unlikely that governments would change the composition of its spending in anticipation of rising income inequality over the next 10 years. Lastly, taking averages would slightly help reduce missing data of our inequality data.

The results confirm that increasing social and infrastructure spending through cuts in defense spending is associated with reduced income inequality (appendix, Table B5). Unlike the annual framework, accounting for the long-run impact of education spending confirm the expected results. When accounting for its long-term impact, higher education spending financed through

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<sup>33</sup> Bleaney, Gemmell, and Kneller (2001) show that 8-year annual lags are required to fully account for the long-run effects of fiscal policy on growth. The 8-year framework is also validated by Acosta-Ormaechea and Morozumi (2017). Our main results are robust when considering a 8-year or 5-year framework (see Tables B6 and B7 in the appendix). However, the 10-year framework does a better job in highlighting the long-run impact of education spending on disposable income inequality. Using the change in the net Gini over 5 or 10 years rather than the average broadly confirm the main results (appendix, Table B8).

cuts in defense spending is associated with lower income inequality. The chapter also finds similar results, though not significant, for health spending.

### **3.4.2. Alternative indicators of inequality**

As additional robustness checks, we use alternative data and indicators to capture income inequality. We first complement our base measure of income inequality, the Gini coefficient after taxes and transfers from the SWIID dataset, with the market Gini from the same dataset. Beyond their direct impact on disposable income Gini, public spending policies can also have second round effects on household market (pre-fiscal) income. Education spending is a good example as it may impact inequality of opportunities and affect market income.

Both disposable (post-fiscal) and market (pre-fiscal) Gini coefficients are derived from various sources to form the SWIID dataset. The SWIID uses the Luxembourg Income Study (LIS) data as baseline and generate model-based multiple imputation estimates of the many missing observations. The LIS is considered as the gold standard with the most comparable cross-country income inequality statistics available and does not include imputed data. However, the dataset covers relatively few countries and years. On average, inequality for each country is observed every five years and most observations start from the 1990s. We test the robustness of our results using exclusively the LIS dataset, which reduces sizably our sample to mostly advanced countries and few emerging market economies.

The Gini is over-sensitive to changes in the middle of the distribution and less sensitive to changes at the top and the bottom. We complement our analysis with various indicators of income shares, which have the advantage of capturing income distribution in the tails. We use the income share of the top 10 and bottom 10 percent from the World Bank's PovcalNet as well as the ratio of the top decile to the bottom decile. This ratio is perceived as providing a good summary of distributional policies because households between the fifth and the ninth decile tend to have a relatively stable share of national income across countries and over time (Palma, 2006, 2011).

All alternative measures of income inequality are highly correlated, with correlation coefficients significant at 1 percent (appendix, Table B3). As predictable, fiscal policy has

limited impact on market income inequality, except for health spending (Table B9).<sup>34</sup> Results, using the Gini coefficient from the LIS dataset as dependent variable confirm our main results. Total spending is negatively and significantly associated with income inequality. Looking at the composition of total spending, all priority spending items seem to be associated with lower income inequality when they are financed through cut in defense spending, though the results are significant only for education and social protection outlays (Table B10).

The chapter also considers the income shares of the top and bottom deciles (Tables B11 and B12). While total spending is associated with a decline in the income share of the top 10 percent, it is associated with an increase in the income share of the bottom decile. Regarding the components of spending, infrastructure outlays are associated with a lower income share of the top decile while social protection outlays are associated with a higher income share of the bottom decile. Results also suggest that an increase in infrastructure spending offset by a corresponding decrease in defense spending is associated with a significant decline in the income share of the top decile and increase in the income share of the bottom decile.

Using the ratio of top to bottom decile income shares as an alternative measure of income inequality also confirms most of the results (Table B13).

### **3.4.3. Accounting for local government spending, the efficiency of public spending, and the use of debt to finance public outlays<sup>35</sup>**

In many countries, the decentralization process has led to a higher share of public goods being delivered by local authorities, particularly in education and health. To account for potential impact of decentralization, the chapter assesses the robustness of our main results to the use of consolidated general government data, which includes spending at the local government

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<sup>34</sup> Using the difference between the market Gini and the disposable income Gini, which captures the extent of redistribution through fiscal policy, confirm our main results: public spending, in particular infrastructure and social outlays, are associated with higher fiscal redistribution.

<sup>35</sup> The chapter also confirms that our main results are valid for advanced and developing countries separately, though the impacts seem to be more precisely estimated in developing economies (Table B14).

level.<sup>36</sup> The results (Table B15) confirm that education, health, and social spending are associated with lower income inequality, particularly when they are financed through cuts in defense spending. Interestingly, accounting local government spending helps to better capture the equalizing effect of public spending, particularly health outlays.

The inefficiencies with which public spending is turned into productive physical capital can undermine the equalizing effect of public outlays. For instance, in the literature on public investment and growth, Gupta and others (2014) show that not accounting for inefficiencies in public investment can lead to an underestimation of their impact on growth. Using the Public Investment Management Assessment (PIMA) overall index, which captures various dimensions of the public investment management cycle, we assess the robustness of our results, with a particular attention to the infrastructure component.<sup>37</sup> The results confirm our prior: the equalizing impact of infrastructure spending increases with the efficiency of capital spending (Table B16).

A key assumption in the chapter is to keep the level of total public spending fixed and assess the impact of a reallocation of public outlays from one category to the other. As such the exercise does not involve any increase in debt. That said, could the prevailing level of debt affect the equalizing effect of public spending? The results illustrate that while public debt slightly reduces the equalizing effect of public spending in infrastructure, social assistance, health, and education, our main results remain valid. That is higher public spending, particularly in infrastructure and social assistance, is associated with lower income inequality (Table B17).

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<sup>36</sup> General government data are much scarcer than central government data. For instance, beyond a smaller sample size, our data does not allow us to separately identify infrastructure spending for the general government.

<sup>37</sup> PIMA is composed of 15 indicators grouped into three stages of the public investment management cycle: (i) Planning; (ii) Allocation; and (iii) Implementation (IMF, 2015). Countries are scored based on different indicators, which are then combined to construct the overall index. IMF (2015 and 2016) provides details of the PIMA assessment, covered areas, and indicators.

### **3.5. Conclusion**

This chapter analyzed the effects of public spending reallocation on income inequality using a newly assembled data on disaggregated public spending for 83 countries across all income groups. The results suggest that, in general, spending reallocations towards social protection and infrastructure are associated with lower income inequality. The chapter shows that higher social protection and infrastructure outlays financed through cuts in defense spending are particularly equalizing. This does not mean that all countries should engage in across-the-board reduction in defense spending. Indeed, the results highlight that financing higher social protection and infrastructure spending through cuts in defense spending is associated with lower income inequality only in countries with the lowest risks of conflict and strong institutions. In countries with higher risk of conflict, there is no evidence that lowering defense spending to finance infrastructure and social outlays improves income distribution. These results may reflect the disproportionately higher negative impact of conflict on the poor and the most vulnerable. Reallocating social protection and infrastructure spending towards other type of spending tend to increase income inequality.

The results also show that accounting for the long-term impact of health spending and particularly education spending is important to better capture their full impact on income inequality. Higher education spending financed through cuts in defense spending is associated with lower income inequality in the long-run.

Looking forward, rising income inequality seems set to remain at the forefront of the economic policy debate around the world. Combined with high public spending, elevated public debt, and limited domestic resources, governments around the world would need policies to address the rising inequality despite limited fiscal space. When the political and security situation allows, reallocating public spending away from defense and towards social protection, infrastructure, and education seems to be a sensible proposition.

## Appendix B

**Table B1. Summary Statistics**

Variable	Mean	Std. Dev.	Min	Max
Net Gini	36.7	9.6	14.1	67.2
Per capita GDP (in thousands)	6.2	11.7	0.0	118.2
Human capital index	2.1	0.7	1.0	3.7
Trade openness	76.7	53.3	0.0	809.2
Share of ICT in capital	2.7	2.0	0.0	11.6
Unemployment rate	8.2	6.0	0.0	70.0
Inflation rate	33.6	424.5	-72.7	23773.1
Total expenditure/GDP	27.5	10.7	7.1	80.7
Education spending/Total spending	11.9	6.2	0.9	30.8
Health spending/Total spending	8.3	5.2	0.6	24.1
Infrastructure spending/Total spending	6.1	3.5	0.7	28.9
Social spending/Total spending	25.8	16.5	0.4	66.0
Defense spending/Total spending	10.2	8.5	0.7	49.1
Top personal income tax rate	40.1	16.1	5.0	95.0

**Table B2. Sample Country List**

The following is the list of 60 countries used in the baseline regressions.

Advanced Economies: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Israel, Italy, Korea, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Sweden, Switzerland, United Kingdom, and United States.
Developing and Emerging Countries: Albania, Argentina, Bolivia, Brazil, Bulgaria, Chile, Colombia, Croatia, Dominican Republic, Egypt, El Salvador, Hungary, Indonesia, Iran, Jamaica, Kazakhstan, Mauritius, Morocco, Panama, Paraguay, Poland, Romania, Russia, South Africa, Syria, Thailand, Tunisia, Turkey, Ukraine, Uruguay and Venezuela.

**Table B3. Pairwise Correlation of Different Measures of Income Distribution**

	Log Gini	Log Gini, LIS	Log Top 10 income share	Log Bottom 10 income share	Ratio of Top to Bottom Decile income shares
Log Gini	1				
Log Gini, LIS	0.9969***	1			
Log Top 10 income share	0.9263***	0.9486***	1		
Log Bottom 10 income share	0.7484***	0.8884***	-0.8097***	1	
Ratio of Top to Bottom Decile income shares	0.2497***	0.8667***	0.2884***	-0.5797***	1

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

**Table B4. Robustness Check: The role of institutions using median value**

	Dependent Variable: Log (Net Gini)								
	No distinction in financing source			Cut in defense to finance infrastructure			Cut in defense to finance social protection		
	All	Institutions above median	Institutions below median	All	Institutions above median	Institutions below median	All	Institutions above median	Institutions below median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total expenditure t-1	-0.00845*** (0.00133)	-0.00780*** (0.00140)	-0.00876*** (0.00245)	-0.00992*** (0.00106)	-0.0100*** (0.00138)	-0.00674* (0.00361)	-0.00801*** (0.00136)	-0.00708*** (0.00153)	-0.00736** (0.00331)
Defense spending t-1	0.00502** (0.00236)	0.00825*** (0.00231)	-0.00325 (0.00359)						
Infrastructure t-1				-0.00832** (0.00341)	-0.0158*** (0.00336)	0.00242 (0.00706)			
Social spending t-1							-0.00512** (0.00227)	-0.00848*** (0.00234)	0.00175 (0.00417)
Other spending t-1				0.00188* (0.00101)	0.00345** (0.00133)	0.00272*** (0.000904)	-0.00331 (0.00266)	-0.00483* (0.00257)	0.00445 (0.00342)
Observations	607	442	165	607	442	165	607	442	165
R-squared	0.707	0.692	0.669	0.705	0.691	0.680	0.710	0.704	0.680
Number of groups	60	42	28	60	42	28	60	42	28

Standard errors in parentheses

Note: Controls variables (GDP per capita, human capital, trade openness, technology, unemployment rate, and inflation) are included but not presented for brevity.

The institutional variable used for these illustrations is the quality of bureaucracy.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table B5. Robustness Check: Long-term impact of spending (10-year framework)**

Dependent Variable: Log (Net Gini), t to t+9									
	No distinction in financing source					Financed by cuts in defense spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	-0.0193 (0.0296)	-0.0354 (0.0284)	-0.0125 (0.0291)	-0.0150 (0.0322)	-0.0113 (0.0281)	-0.00932 (0.0291)	-0.0301 (0.0271)	-0.00877 (0.0286)	-0.0123 (0.0308)
Log(GDP per capita) <sup>2</sup> t-1	-0.00113 (0.00652)	0.00217 (0.00577)	-0.00393 (0.00659)	-2.97e-05 (0.00768)	-0.00164 (0.00692)	-0.00197 (0.00709)	0.00226 (0.00625)	-0.00320 (0.00736)	-0.000487 (0.00754)
Human capital t-1	-0.231*** (0.0181)	-0.249*** (0.0118)	-0.240*** (0.0115)	-0.201*** (0.0110)	-0.236*** (0.0141)	-0.242*** (0.0230)	-0.251*** (0.0134)	-0.239*** (0.0132)	-0.210*** (0.0125)
Trade openness t-1	-0.000366*** (8.29e-05)	-0.000313*** (7.31e-05)	-0.000252*** (7.71e-05)	-0.000494*** (7.84e-05)	-0.000516*** (0.000103)	-0.000502*** (0.000115)	-0.000488*** (9.83e-05)	-0.000434*** (0.000129)	-0.000546*** (9.82e-05)
Technology t-1	0.0262*** (0.00403)	0.0254*** (0.00376)	0.0253*** (0.00404)	0.0255*** (0.00333)	0.0196*** (0.00517)	0.0193*** (0.00597)	0.0184*** (0.00500)	0.0199*** (0.00523)	0.0222*** (0.00492)
Unemployment rate t-1	0.00739*** (0.00188)	0.00726*** (0.00157)	0.00564*** (0.00191)	0.00830*** (0.00229)	0.00840*** (0.00231)	0.00826*** (0.00225)	0.00849*** (0.00197)	0.00724*** (0.00256)	0.00865*** (0.00243)
Inflation t-1	8.71e-05 (5.59e-05)	8.61e-05 (5.46e-05)	6.49e-05 (4.68e-05)	9.38e-05* (4.85e-05)	7.69e-05 (4.60e-05)	7.17e-05 (5.12e-05)	8.00e-05 (5.11e-05)	6.63e-05 (4.53e-05)	8.80e-05* (4.63e-05)
Total expenditure t-1	-0.00836*** (0.000908)	-0.00854*** (0.000982)	-0.00889*** (0.000867)	-0.00716*** (0.000942)	-0.00727*** (0.00110)	-0.00729*** (0.00108)	-0.00736*** (0.00116)	-0.00773*** (0.00120)	-0.00687*** (0.00102)
Education spending t-1	0.000615 (0.00205)					-0.00649* (0.00379)			
Health spending t-1		0.00530*** (0.00139)					-0.000307 (0.00189)		
Infrastructure t-1			-0.00944*** (0.00283)					-0.0109*** (0.00243)	
Social spending t-1				-0.00335*** (0.000566)					-0.00552*** (0.00189)
Defense spending t-1					0.00565*** (0.00199)				
Other spending t-1						-0.00576** (0.00211)	-0.00611*** (0.00203)	-0.00496** (0.00219)	-0.00299 (0.00212)
Observations	652	652	652	652	652	652	652	652	652
R-squared	0.683	0.696	0.690	0.705	0.699	0.699	0.714	0.702	0.708
Number of groups	62	62	62	62	62	62	62	62	62

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B6. Robustness Check: Long-term impact of spending (8-year framework)**

	Dependent Variable: Log (Net Gini), t to t+7								
	No distinction in financing source					Financed by cuts in defense spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	-0.0158 (0.0316)	-0.0313 (0.0300)	-0.00751 (0.0310)	-0.0101 (0.0343)	-0.00597 (0.0302)	-0.00524 (0.0312)	-0.0256 (0.0287)	-0.00347 (0.0307)	-0.00696 (0.0329)
Log(GDP per capita) <sup>2</sup> t-1	-0.00181 (0.00701)	0.00140 (0.00617)	-0.00491 (0.00707)	-0.000865 (0.00823)	-0.00255 (0.00747)	-0.00267 (0.00762)	0.00150 (0.00670)	-0.00410 (0.00792)	-0.00139 (0.00810)
Human capital t-1	-0.230*** (0.0184)	-0.252*** (0.0122)	-0.244*** (0.0116)	-0.203*** (0.0109)	-0.239*** (0.0144)	-0.242*** (0.0232)	-0.254*** (0.0139)	-0.242*** (0.0134)	-0.213*** (0.0128)
Trade openness t-1	-0.000383*** (8.57e-05)	-0.000316*** (7.06e-05)	-0.000254*** (7.68e-05)	-0.000504*** (7.96e-05)	-0.000534*** (0.000106)	-0.000528*** (0.000123)	-0.000504*** (0.000101)	-0.000452*** (0.000134)	-0.000564*** (0.000102)
Technology t-1	0.0262*** (0.00402)	0.0253*** (0.00380)	0.0251*** (0.00410)	0.0254*** (0.00340)	0.0190*** (0.00538)	0.0189*** (0.00610)	0.0177*** (0.00519)	0.0193*** (0.00545)	0.0216*** (0.00515)
Unemployment rate t-1	0.00798*** (0.00205)	0.00770*** (0.00170)	0.00608*** (0.00204)	0.00887*** (0.00256)	0.00900*** (0.00254)	0.00895*** (0.00247)	0.00907*** (0.00217)	0.00786*** (0.00278)	0.00928*** (0.00271)
Inflation t-1	9.51e-05 (5.72e-05)	9.07e-05 (5.56e-05)	6.87e-05 (4.74e-05)	9.85e-05* (4.92e-05)	8.07e-05* (4.65e-05)	7.88e-05 (5.19e-05)	8.40e-05 (5.17e-05)	7.02e-05 (4.57e-05)	9.18e-05* (4.68e-05)
Total expenditure t-1	-0.00833*** (0.000955)	-0.00857*** (0.00102)	-0.00890*** (0.000903)	-0.00708*** (0.00101)	-0.00717*** (0.00116)	-0.00717*** (0.00115)	-0.00727*** (0.00121)	-0.00762*** (0.00127)	-0.00674*** (0.00109)
Education spending t-1	0.00115 (0.00211)					-0.00641 (0.00378)			
Health spending t-1		0.00554*** (0.00140)					-0.000498 (0.00199)		
Infrastructure t-1			-0.00969*** (0.00295)					-0.0113*** (0.00252)	
Social spending t-1				-0.00348*** (0.000632)					-0.00599*** (0.00201)
Defense spending t-1					0.00610*** (0.00211)				
Other spending t-1						-0.00614*** (0.00220)	-0.00657*** (0.00214)	-0.00542** (0.00232)	-0.00344 (0.00221)
Observations	650	650	650	650	650	650	650	650	650
R-squared	0.681	0.695	0.688	0.703	0.699	0.699	0.715	0.701	0.707
Number of groups	62	62	62	62	62	62	62	62	62

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B7. Robustness Check: Long-term impact of spending (5-year framework)**

	Dependent Variable: Log (Net Gini), t to t+4								
	No distinction in financing source					Financed by cuts in defense spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	-0.0108 (0.0331)	-0.0260 (0.0310)	-0.000321 (0.0324)	-0.00345 (0.0356)	0.00126 (0.0320)	0.000289 (0.0333)	-0.0199 (0.0299)	0.00396 (0.0325)	0.000316 (0.0342)
Log(GDP per capita) <sup>2</sup> t-1	-0.00242 (0.00740)	0.000777 (0.00647)	-0.00598 (0.00746)	-0.00181 (0.00857)	-0.00351 (0.00789)	-0.00335 (0.00804)	0.000848 (0.00701)	-0.00513 (0.00835)	-0.00244 (0.00843)
Human capital t-1	-0.229*** (0.0185)	-0.258*** (0.0126)	-0.248*** (0.0115)	-0.209*** (0.0105)	-0.244*** (0.0144)	-0.241*** (0.0236)	-0.260*** (0.0144)	-0.247*** (0.0134)	-0.220*** (0.0139)
Trade openness t-1	-0.000407*** (9.09e-05)	-0.000321*** (6.84e-05)	-0.000258*** (8.13e-05)	-0.000508*** (7.78e-05)	-0.000550*** (0.000110)	-0.000557*** (0.000132)	-0.000518*** (0.000104)	-0.000467*** (0.000140)	-0.000578*** (0.000105)
Technology t-1	0.0264*** (0.00409)	0.0252*** (0.00392)	0.0252*** (0.00425)	0.0254*** (0.00359)	0.0187*** (0.00572)	0.0188*** (0.00637)	0.0174*** (0.00550)	0.0190*** (0.00576)	0.0210*** (0.00563)
Unemployment rate t-1	0.00909*** (0.00226)	0.00865*** (0.00188)	0.00700*** (0.00219)	0.00983*** (0.00284)	0.0100*** (0.00283)	0.0101*** (0.00273)	0.0101*** (0.00240)	0.00889*** (0.00298)	0.0103*** (0.00300)
Inflation t-1	0.000105* (5.86e-05)	9.66e-05 (5.71e-05)	7.38e-05 (4.82e-05)	0.000104** (5.03e-05)	8.60e-05* (4.72e-05)	8.85e-05 (5.27e-05)	8.96e-05* (5.27e-05)	7.53e-05 (4.61e-05)	9.60e-05* (4.73e-05)
Total expenditure t-1	-0.00838*** (0.00100)	-0.00867*** (0.00107)	-0.00898*** (0.000939)	-0.00717*** (0.00108)	-0.00716*** (0.00123)	-0.00715*** (0.00123)	-0.00729*** (0.00128)	-0.00761*** (0.00132)	-0.00677*** (0.00116)
Education spending t-1	0.00182 (0.00218)					-0.00601 (0.00389)			
Health spending t-1		0.00597*** (0.00144)					-0.000388 (0.00205)		
Infrastructure t-1			-0.0100*** (0.00331)					-0.0118*** (0.00290)	
Social spending t-1				-0.00339*** (0.000656)					-0.00632*** (0.00214)
Defense spending t-1					0.00642*** (0.00223)				
Other spending t-1						-0.00636*** (0.00231)	-0.00690*** (0.00226)	-0.00573** (0.00240)	-0.00401 (0.00243)
Observations	648	648	648	648	648	648	648	648	648
R-squared	0.680	0.695	0.687	0.700	0.698	0.698	0.716	0.701	0.705
Number of groups	62	62	62	62	62	62	62	62	62

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B8. Robustness Check: Change in Net Gini as the dependent variable**

	Dependent Variable: Change in Net Gini, <b>t to t+4</b>			Dependent Variable: Change in Net Gini, <b>t to t+9</b>	
	(1)	(2)	(3)	(4)	(5)
Total expenditure t-1	0.000363 (0.000406)	0.000579 (0.000463)	0.000420 (0.000417)	0.000612 (0.000757)	0.00104 (0.000809)
Infrastructure t-1	-0.00333** (0.00152)				
Social spending t-1		-0.000152 (0.000269)			
Defense spending t-1			-0.000271 (0.000478)		
Education spending t-1				-0.00461*** (0.00136)	
Health spending t-1					-0.00191* (0.000952)
Observations	578	578	578	498	498
R-squared	0.168	0.159	0.159	0.254	0.228
Number of groups	60	60	60	57	57

Standard errors in parentheses

Note: Controls variables (GDP per capita, human capital, trade openness, technology, unemployment rate, and inflation) are included but not presented for brevity.

We show two different time spans (5 year change and 10 year change) because the data seems to support that the impact of education and health spending tends to materialize after a longer time horizon.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B9. Robustness Check: Market Gini**

	Dependent Variable: Log (Net Gini)								
	No distinction in financing source					Financed by cuts in defense spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	0.0338 (0.0249)	0.0238 (0.0263)	0.0376 (0.0268)	0.0369 (0.0259)	0.0358 (0.0248)	0.0322 (0.0237)	0.0233 (0.0258)	0.0369 (0.0260)	0.0356 (0.0253)
Log(GDP per capita) <sup>2</sup> t-1	-0.00127 (0.00598)	0.000918 (0.00593)	-0.00222 (0.00674)	-0.00169 (0.00634)	-0.00167 (0.00606)	-0.00106 (0.00572)	0.000976 (0.00583)	-0.00229 (0.00668)	-0.00144 (0.00619)
Human capital t-1	-0.0837*** (0.0261)	-0.102*** (0.0201)	-0.0928*** (0.0199)	-0.0875*** (0.0182)	-0.0922*** (0.0192)	-0.0821*** (0.0260)	-0.102*** (0.0198)	-0.0931*** (0.0195)	-0.0833*** (0.0179)
Trade openness t-1	-0.000508*** (5.56e-05)	-0.000455*** (5.86e-05)	-0.000465*** (6.58e-05)	-0.000500*** (7.03e-05)	-0.000457*** (7.24e-05)	-0.000482*** (6.84e-05)	-0.000435*** (7.02e-05)	-0.000425*** (9.69e-05)	-0.000469*** (7.35e-05)
Technology t-1	0.0166*** (0.00271)	0.0155*** (0.00268)	0.0162*** (0.00282)	0.0164*** (0.00260)	0.0170*** (0.00277)	0.0175*** (0.00286)	0.0161*** (0.00279)	0.0171*** (0.00272)	0.0179*** (0.00260)
Unemployment rate t-1	0.0123*** (0.00211)	0.0120*** (0.00185)	0.0118*** (0.00230)	0.0121*** (0.00231)	0.0119*** (0.00232)	0.0121*** (0.00212)	0.0119*** (0.00189)	0.0115*** (0.00237)	0.0119*** (0.00235)
Inflation t-1	6.36e-05** (2.47e-05)	5.73e-05** (2.51e-05)	5.29e-05** (2.21e-05)	5.77e-05** (2.28e-05)	5.58e-05** (2.23e-05)	6.51e-05** (2.45e-05)	5.73e-05** (2.47e-05)	5.16e-05** (2.12e-05)	5.93e-05** (2.22e-05)
Total expenditure t-1	0.000440 (0.000589)	0.000165 (0.000602)	0.000308 (0.000681)	0.000613 (0.000664)	0.000130 (0.000777)	0.000139 (0.000773)	-3.59e-05 (0.000762)	-6.15e-05 (0.000961)	0.000333 (0.000756)
Education spending t-1	0.00108 (0.00120)					0.00233 (0.00174)			
Health spending t-1		0.00399*** (0.00127)					0.00464*** (0.00133)		
Infrastructure t-1			-0.00160 (0.00315)					-0.00119 (0.00296)	
Social spending t-1				-0.000432 (0.000523)					0.000794 (0.00104)
Defense spending t-1					-0.000840 (0.00104)				
Other spending t-1						0.00104 (0.00106)	0.000674 (0.00100)	0.00112 (0.00129)	0.00161 (0.00127)
Observations	607	607	607	607	607	607	607	607	607
R-squared	0.414	0.435	0.413	0.414	0.414	0.415	0.436	0.415	0.416
Number of groups	60	60	60	60	60	60	60	60	60

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B10. Robustness Check: Gini from LIS**

	Dependent Variable: Log (Gini)								
	No distinction in financing source					Financed by cuts in defense spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	-0.130 (0.135)	-0.190 (0.138)	-0.227 (0.185)	-0.200 (0.193)	-0.219 (0.180)	-0.138 (0.143)	-0.190 (0.137)	-0.226 (0.189)	-0.204 (0.195)
Log(GDP per capita) <sup>2</sup> t-1	0.0103 (0.0207)	0.0231 (0.0234)	0.0277 (0.0287)	0.0275 (0.0308)	0.0302 (0.0279)	0.0140 (0.0221)	0.0274 (0.0226)	0.0309 (0.0288)	0.0302 (0.0308)
Human capital t-1	-0.279*** (0.0674)	-0.242*** (0.0670)	-0.197** (0.0790)	-0.160** (0.0730)	-0.207*** (0.0722)	-0.284*** (0.0700)	-0.268*** (0.0619)	-0.211** (0.0765)	-0.177** (0.0661)
Trade openness t-1	-0.00125** (0.000581)	-0.00160*** (0.000537)	-0.00132 (0.000882)	-0.00136** (0.000633)	-0.00116* (0.000591)	-0.000982* (0.000571)	-0.00105* (0.000574)	-0.000984 (0.000853)	-0.00105 (0.000670)
Technology t-1	2.54e-06** (9.42e-07)	2.47e-06*** (8.48e-07)	2.74e-06** (1.15e-06)	2.25e-06** (1.05e-06)	1.59e-06 (1.30e-06)	1.78e-06 (1.27e-06)	9.75e-07 (9.44e-07)	1.60e-06 (1.35e-06)	1.40e-06 (1.20e-06)
Unemployment rate t-1	0.0110 (0.00723)	0.0124* (0.00661)	0.0127 (0.00891)	0.0119** (0.00525)	0.0151** (0.00694)	0.0117 (0.00719)	0.0131** (0.00569)	0.0140 (0.00859)	0.0128** (0.00516)
Inflation t-1	-0.00264* (0.00130)	-0.00263 (0.00172)	-0.00329* (0.00180)	-0.00275 (0.00194)	-0.00347** (0.00167)	-0.00286** (0.00133)	-0.00291** (0.00140)	-0.00353* (0.00175)	-0.00301 (0.00186)
Total expenditure t-1	-0.00782** (0.00282)	-0.00895*** (0.00274)	-0.00887*** (0.00269)	-0.00692** (0.00314)	-0.00672** (0.00302)	-0.00678** (0.00311)	-0.00697** (0.00302)	-0.00709** (0.00301)	-0.00583* (0.00316)
Education spending t-1	-0.0146* (0.00766)					-0.0202** (0.00918)			
Health spending t-1		0.00709*** (0.00240)					-0.00493 (0.00414)		
Infrastructure t-1			-0.00646 (0.00972)					-0.0144 (0.0104)	
Social spending t-1				-0.00537** (0.00257)					-0.0126** (0.00515)
Defense spending t-1					0.0104** (0.00456)				
Other spending t-1						-0.00676 (0.00453)	-0.0128*** (0.00444)	-0.0101** (0.00472)	-0.00794* (0.00386)
Observations	89	89	89	89	89	89	89	89	89
R-squared	0.729	0.715	0.676	0.703	0.691	0.736	0.741	0.692	0.712
Number of groups	28	28	28	28	28	28	28	28	28

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: The dependent variable Gini is from the Luxembourg Income Study (LIS) database

**Table B11. Robustness Check: Top 10 percent income share**

Dependent Variable: Log (Top 10 percent income share)									
No distinction in financing source					Financed by cuts in defense spending				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	-0.0525 (0.0418)	-0.0593 (0.0518)	-0.0605 (0.0508)	-0.0570 (0.0471)	-0.0440 (0.0495)	-0.0375 (0.0424)	-0.0429 (0.0526)	-0.0472 (0.0502)	-0.0440 (0.0493)
Log(GDP per capita) <sup>2</sup> t-1	0.0134 (0.00920)	0.0147 (0.0106)	0.0124 (0.0108)	0.0145 (0.0102)	0.0120 (0.0102)	0.0108 (0.00915)	0.0119 (0.0105)	0.0106 (0.0107)	0.0121 (0.0103)
Human capital t-1	-0.206*** (0.0351)	-0.258*** (0.0222)	-0.257*** (0.0213)	-0.246*** (0.0227)	-0.272*** (0.0259)	-0.220*** (0.0323)	-0.272*** (0.0259)	-0.268*** (0.0255)	-0.265*** (0.0221)
Trade openness t-1	-0.000593 (0.000417)	-0.000561 (0.000394)	-0.000462 (0.000355)	-0.000607 (0.000417)	-0.000447 (0.000340)	-0.000477 (0.000376)	-0.000438 (0.000358)	-0.000383 (0.000330)	-0.000474 (0.000376)
Technology t-1	2.30e-06*** (6.47e-07)	2.33e-06*** (6.67e-07)	2.55e-06*** (6.51e-07)	2.40e-06*** (7.21e-07)	2.08e-06*** (7.16e-07)	2.08e-06*** (6.61e-07)	2.10e-06*** (6.95e-07)	2.32e-06*** (6.88e-07)	2.14e-06** (7.90e-07)
Unemployment rate t-1	0.00947* (0.00469)	0.00689* (0.00382)	0.00441 (0.00421)	0.00743* (0.00364)	0.00747* (0.00382)	0.00981* (0.00497)	0.00735* (0.00405)	0.00527 (0.00502)	0.00762* (0.00394)
Inflation t-1	0.000244*** (4.07e-05)	0.000186*** (1.94e-05)	0.000167*** (2.52e-05)	0.000192*** (2.14e-05)	0.000194*** (2.05e-05)	0.000249*** (4.40e-05)	0.000193*** (2.19e-05)	0.000177*** (3.17e-05)	0.000196*** (2.30e-05)
Total expenditure t-1	-0.0113*** (0.00146)	-0.0111*** (0.00150)	-0.0120*** (0.00171)	-0.0104*** (0.00226)	-0.0103*** (0.00208)	-0.0105*** (0.00202)	-0.0102*** (0.00203)	-0.0112*** (0.00246)	-0.0100*** (0.00254)
Education spending t-1	0.00651* (0.00358)					-0.00128 (0.00595)			
Health spending t-1		-0.000292 (0.00175)					-0.00836 (0.00627)		
Infrastructure t-1			-0.00990** (0.00462)					-0.0146*** (0.00414)	
Social spending t-1				-0.00135 (0.00157)					-0.00791 (0.00635)
Defense spending t-1					0.00804 (0.00637)				
Other spending t-1						-0.00754 (0.00666)	-0.00804 (0.00637)	-0.00653 (0.00685)	-0.00732 (0.00581)
Observations	199	199	199	199	199	199	199	199	199
R-squared	0.768	0.755	0.763	0.758	0.763	0.775	0.763	0.768	0.763
Number of groups	36	36	36	36	36	36	36	36	36

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B12. Robustness Check: Bottom 10 percent income share**

	Dependent Variable: Log (Bottom 10 percent income share)								
	No distinction in financing source					Financed by cuts in defense spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	0.223** (0.107)	0.280* (0.142)	0.278* (0.143)	0.246* (0.132)	0.245 (0.144)	0.199* (0.106)	0.248 (0.148)	0.255* (0.149)	0.245* (0.139)
Log(GDP per capita)2t-1	-0.0661** (0.0267)	-0.0766** (0.0310)	-0.0690** (0.0296)	-0.0731** (0.0308)	-0.0705** (0.0307)	-0.0618** (0.0259)	-0.0709** (0.0311)	-0.0658** (0.0301)	-0.0728** (0.0320)
Human capital t-1	0.245* (0.128)	0.607*** (0.114)	0.604*** (0.110)	0.493*** (0.0929)	0.634*** (0.121)	0.269** (0.123)	0.633*** (0.122)	0.623*** (0.116)	0.495*** (0.102)
Trade openness t-1	0.00245* (0.00138)	0.00231* (0.00116)	0.00196* (0.00105)	0.00263* (0.00147)	0.00204* (0.00111)	0.00226 (0.00135)	0.00206* (0.00116)	0.00183* (0.00106)	0.00261 (0.00159)
Technology t-1	-5.20e-06** (2.02e-06)	-5.28e-06** (2.11e-06)	-6.03e-06*** (2.09e-06)	-6.09e-06*** (1.90e-06)	-4.86e-06** (2.24e-06)	-4.84e-06** (2.04e-06)	-4.81e-06** (2.23e-06)	-5.63e-06** (2.31e-06)	-6.06e-06*** (2.03e-06)
Unemployment rate t-1	-0.0455** (0.0221)	-0.0288* (0.0150)	-0.0207 (0.0145)	-0.0323* (0.0160)	-0.0293* (0.0151)	-0.0460* (0.0227)	-0.0296* (0.0157)	-0.0221 (0.0159)	-0.0323* (0.0161)
Inflation t-1	-0.000841*** (0.000234)	-0.000447*** (0.000108)	-0.000386*** (0.000113)	-0.000490*** (0.000140)	-0.000459*** (0.000107)	-0.000848*** (0.000238)	-0.000461*** (0.000108)	-0.000402*** (0.000118)	-0.000490*** (0.000141)
Total expenditure t-1	0.0287*** (0.00561)	0.0277*** (0.00583)	0.0304*** (0.00641)	0.0213** (0.00949)	0.0260*** (0.00649)	0.0274*** (0.00652)	0.0260*** (0.00646)	0.0289*** (0.00738)	0.0212** (0.00955)
Education spending t-1	-0.0451*** (0.0160)					-0.0323 (0.0191)			
Health spending t-1		-0.000870 (0.00333)					0.0151 (0.0140)		
Infrastructure t-1			0.0295 (0.0175)					0.0373** (0.0166)	
Social spending t-1				0.0124* (0.00702)					0.0133 (0.0154)
Defense spending t-1					-0.0159 (0.0141)				
Other spending t-1						0.0124 (0.0154)	0.0159 (0.0142)	0.0110 (0.0147)	0.000967 (0.0161)
Observations	199	199	199	199	199	199	199	199	199
R-squared	0.644	0.572	0.581	0.598	0.576	0.646	0.576	0.582	0.598
Number of groups	36	36	36	36	36	36	36	36	36

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table B13. Robustness Check: Ratio of Top to Bottom Decile Income Shares**

	Dependent Variable: Ratio of Top to Bottom Decile Income Shares								
	No distinction in financing source				Financed by cuts in defense spending				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(GDP per capita)t-1	-11.20 (9.013)	-17.06* (8.989)	-16.51* (8.264)	-12.58 (9.277)	-11.82 (8.783)	-11.78 (9.057)	-7.342 (8.714)	-12.41 (9.234)	-12.99 (8.881)
Log(GDP per capita) <sup>2</sup> t-1	3.218* (1.761)	4.272** (1.881)	3.358* (1.695)	3.813* (1.939)	3.380* (1.831)	3.662* (1.933)	2.537 (1.675)	3.451* (1.872)	2.858 (1.868)
Human capital t-1	5.659 (10.48)	-29.36** (12.33)	-29.11** (11.29)	-15.13** (6.324)	-33.31** (13.36)	-16.32** (7.746)	1.910 (9.554)	-33.18** (13.48)	-32.06** (11.89)
Trade openness t-1	-0.144 (0.0966)	-0.133* (0.0730)	-0.0907 (0.0540)	-0.171 (0.111)	-0.0931 (0.0644)	-0.163 (0.120)	-0.114 (0.0874)	-0.0978 (0.0664)	-0.0697 (0.0589)
Technology t-1	-6.23e-06 (0.000188)	-2.83e-06 (0.000146)	8.82e-05 (0.000138)	0.000102 (0.000120)	-6.12e-05 (0.000153)	8.56e-05 (0.000109)	-6.33e-05 (0.000178)	-6.98e-05 (0.000146)	2.53e-05 (0.000136)
Unemployment rate t-1	4.270 (2.562)	2.685 (1.717)	1.715 (1.296)	3.103 (1.820)	2.748 (1.781)	3.114* (1.822)	4.358 (2.593)	2.814 (1.740)	1.945 (1.326)
Inflation t-1	0.0569** (0.0226)	0.0190*** (0.00577)	0.0117 (0.00835)	0.0241** (0.0104)	0.0205*** (0.00572)	0.0243** (0.0103)	0.0581** (0.0230)	0.0210*** (0.00565)	0.0142* (0.00811)
Total expenditure t-1	-0.980** (0.402)	-0.889** (0.356)	-1.192*** (0.408)	-0.0747 (0.674)	-0.631* (0.331)	-0.0502 (0.647)	-0.770* (0.388)	-0.643* (0.348)	-0.960** (0.406)
Education spending t-1	4.371** (1.930)					2.366 (1.659)			
Health spending t-1		0.169 (0.416)					-2.121* (1.171)		
Infrastructure t-1			-3.432 (2.658)					-4.671 (2.823)	
Social spending t-1				-1.553* (0.867)					-1.959 (1.198)
Defense spending t-1					2.285* (1.248)				
Other spending t-1						-1.942* (1.106)	-2.284* (1.251)	-1.733 (1.141)	-0.453 (1.388)
Observations	199	199	199	199	199	199	199	199	199
R-squared	0.292	0.207	0.221	0.259	0.216	0.259	0.299	0.216	0.226
Number of groups	36	36	36	36	36	36	36	36	36

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B14. Robustness Check: Advanced vs. Developing Countries**  
(No distinction of financing source)

	Dependent Variable: Log (Net Gini), t to t+9									
	Advanced economies					Developing economies				
	General Government				Central Government	General Government				Central Government
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total expenditure t-1	-0.00877*** (0.00167)	-0.00914*** (0.00166)	-0.00870*** (0.00216)	-0.00739*** (0.00154)	-0.00896*** (0.00130)	-0.00959*** (0.000678)	-0.00929*** (0.000611)	-0.00777*** (0.000947)	-0.00850*** (0.000749)	-0.00923*** (0.00108)
Education spending t-1	0.00267 (0.00297)					-0.00523** (0.00217)				
Health spending t-1		-0.0112*** (0.00249)					-0.00443** (0.00168)			
Social spending t-1			-0.000683 (0.000985)					-0.00270*** (0.000684)		
Defense spending t-1				0.0105*** (0.00122)					0.00534** (0.00206)	
Infrastructure t-1					-0.0107*** (0.00317)					-0.00756* (0.00405)
Observations	187	187	187	187	166	463	463	463	463	486
R-squared	0.743	0.771	0.742	0.791	0.790	0.776	0.775	0.778	0.775	0.721
Number of groups	32	32	32	32	28	42	42	42	42	53

Standard errors in parentheses

Note: Controls variables (GDP per capita, human capital, trade openness, technology, unemployment rate, and inflation) are included but not presented for brevity.

Because general government data does not specifically separate infrastructure spending, we use central government data on infrastructure spending for this robustness check.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B15. Robustness Check: Use of General Government Data**

	Dependent Variable: Log (Net Gini), t to t+9						
	No distinction in financing source				Financed by cuts in defense spending		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total expenditure t-1	-0.00971*** (0.000592)	-0.00973*** (0.000536)	-0.00806*** (0.000919)	-0.00809*** (0.000689)	-0.00831*** (0.000684)	-0.00850*** (0.000636)	-0.00762*** (0.000890)
Education spending t-1	-0.00276** (0.00123)				-0.00949*** (0.00212)		
Health spending t-1		-0.00755*** (0.00134)				-0.0111*** (0.00180)	
Social spending t-1			-0.00252*** (0.000681)				-0.00876*** (0.00107)
Defense spending t-1				0.00828*** (0.00111)			
Other spending t-1					-0.00816*** (0.00105)	-0.00705*** (0.000983)	-0.00759*** (0.00124)
Observations	650	650	650	650	650	650	650
R-squared	0.751	0.761	0.756	0.772	0.772	0.775	0.773
Number of groups	51	51	51	51	51	51	51

Standard errors in parentheses.

Note: Controls variables (GDP per capita, human capital, trade openness, technology, unemployment rate, and inflation) are included but not presented for brevity.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B16. Robustness Check: Controlling for the efficiency of capital spending**

	Dependent Variable: Log (Net Gini)			
	(1)	(2)	(3)	(4)
Overall PIMA Index	0.0423 (0.0476)	-0.0205 (0.0435)	0.0115 (0.0363)	-0.0172 (0.0490)
Total expenditure t-1	-0.00835 (0.00995)	-0.0141 (0.00967)	-0.0129 (0.00995)	-0.0140 (0.0109)
PIMA*total expenditure t-1	0.000255 (0.00130)	0.00118 (0.00126)	0.000905 (0.00127)	0.00113 (0.00152)
Education spending t-1	0.0359*** (0.00561)			
PIMA*Education spending t-1	-0.00502*** (0.000948)			
Health spending t-1		0.00728 (0.0141)		
PIMA*Health spending t-1		-0.000778 (0.00182)		
Infrastructure t-1			0.0381 (0.0240)	
PIMA*Infrastructure t-1			-0.00770** (0.00321)	
Social spending t-1				0.00228 (0.00642)
PIMA*Social spending t-1				-0.000101 (0.00100)
Observations	322	322	322	322
R-squared	0.724	0.698	0.713	0.700
Number of groups	30	30	30	30

Standard errors in parentheses

Note: Controls variables (GDP per capita, human capital, trade openness, technology, unemployment rate and inflation) are included but not presented for brevity.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table B17. Robustness Check: Controlling for debt financing of public outlays**

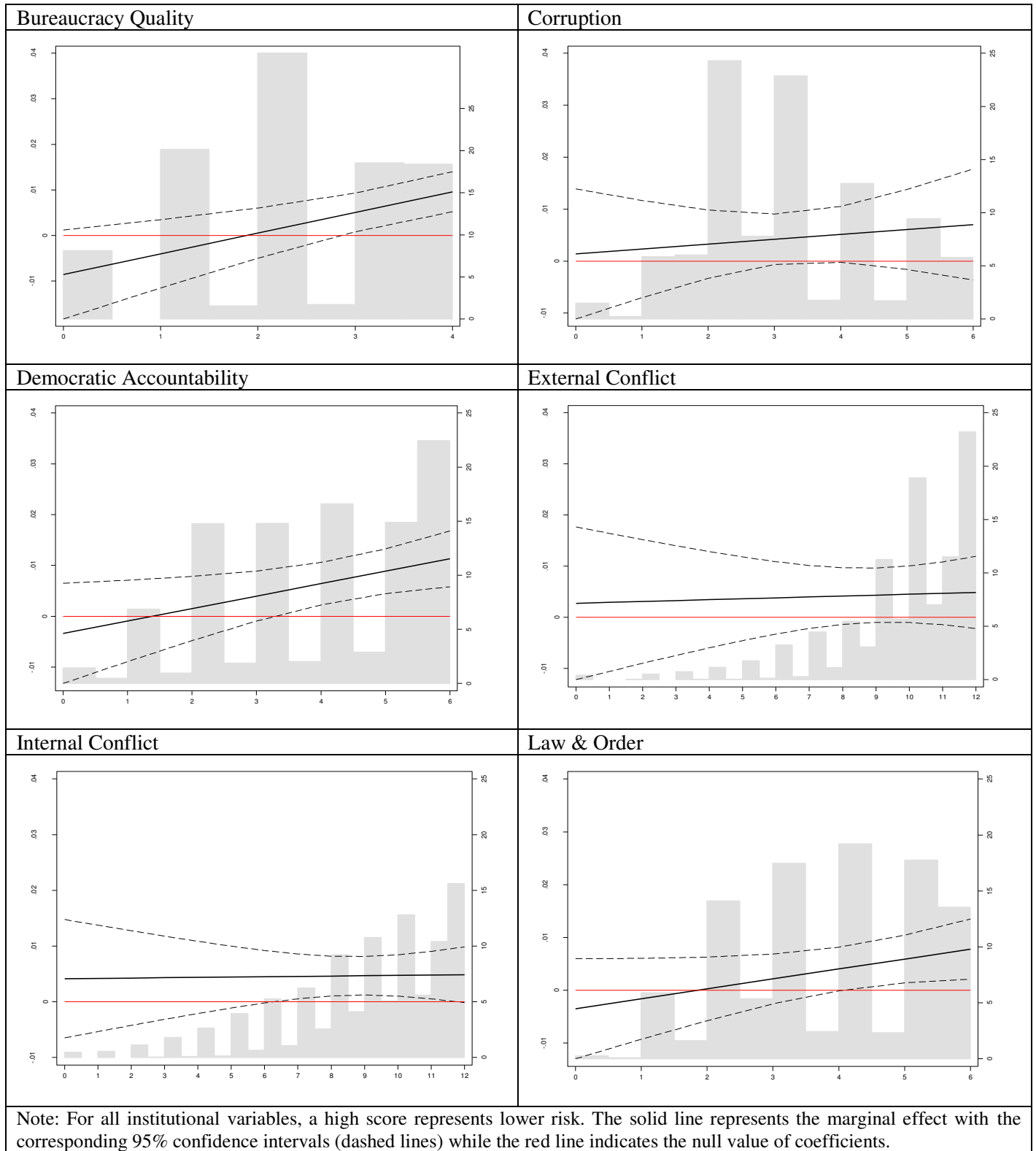
	Dependent Variable: Log (Net Gini)			
	(1)	(2)	(3)	(4)
Total expenditure t-1	-0.0115*** (0.00331)	-0.0130*** (0.00288)	-0.0117*** (0.00320)	-0.00962*** (0.00257)
Debt*total expenditure t-1	2.02e-05 (3.69e-05)	4.09e-05 (2.56e-05)	2.20e-05 (3.56e-05)	1.98e-05 (2.18e-05)
Education spending t-1	-0.00445 (0.00443)			
Debt*education spending t-1	0.000178*** (5.43e-05)			
Health spending t-1		-0.00236 (0.00213)		
Debt*health spending t-1		0.000151*** (5.08e-05)		
Infrastructure t-1			-0.0292*** (0.00571)	
Debt*Infrastructure t-1			0.000560*** (6.79e-05)	
Social spending t-1				-0.00262* (0.00141)
Debt*social spending t-1				1.12e-05 (2.42e-05)
Observations	403	403	403	403
R-squared	0.793	0.795	0.806	0.786
Number of groups	53	53	53	53

Standard errors in parentheses

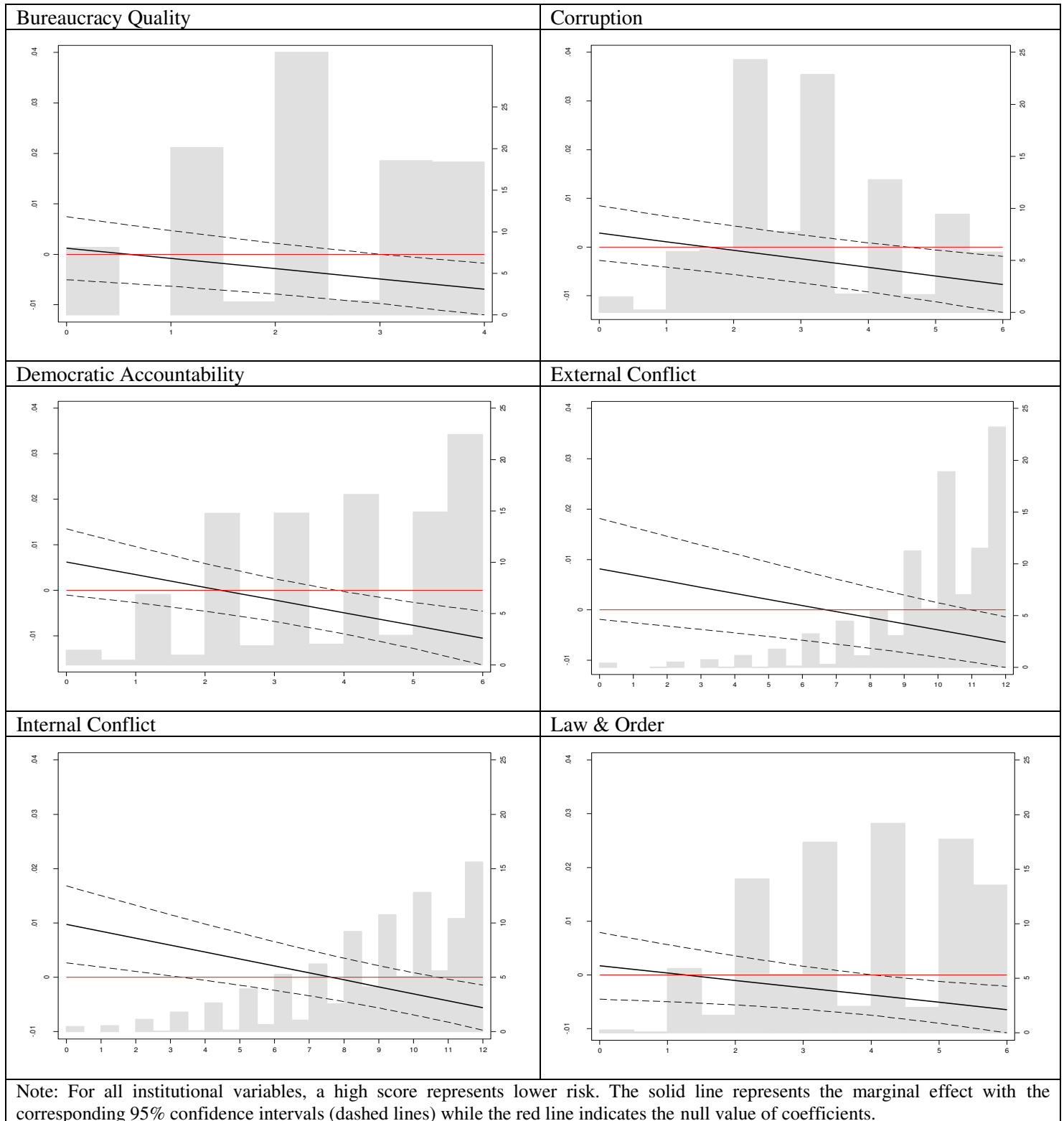
Note: Controls variables (GDP per capita, human capital, trade openness, technology, unemployment rate, inflation, and public debt level) are included but not presented for brevity.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

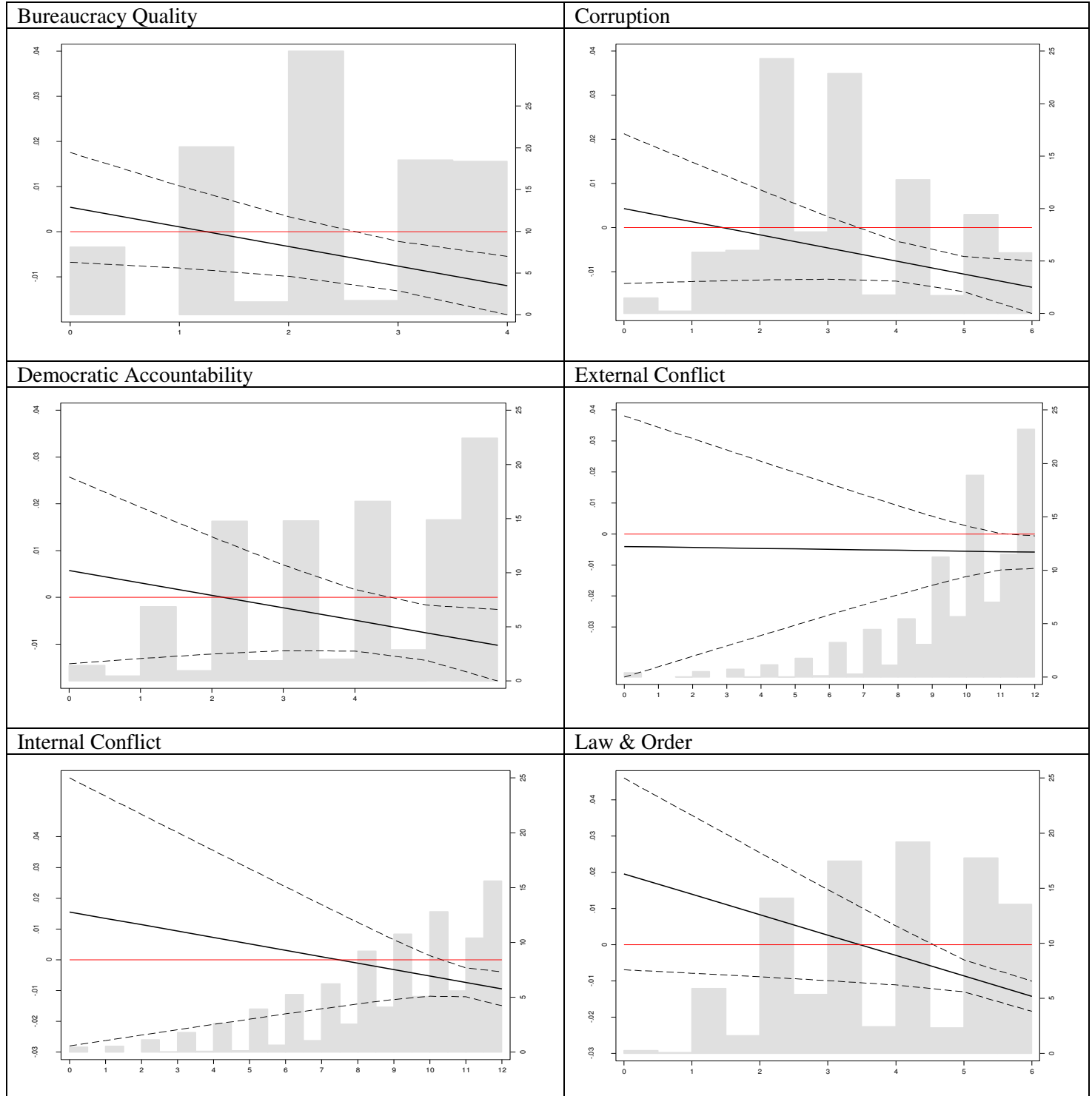
**Figure B1. The Role of Conflict and Institutions: Change in Defense Spending**  
(No distinction of financing source)



**Figure B2. Social Protection Financed by cuts in Defense: The Role of Conflict and Institutions**



**Figure B3. Infrastructure Financed by cuts in Defense: The Role of Conflict and Institutions**



Note: For all institutional variables, a high score represents lower risk. The solid line represents the marginal effect with the corresponding 95% confidence intervals (dashed lines) while the red line indicates the null value of coefficients.





# Chapter 4 Informal Sector Heterogeneity and Income Inequality: Evidence from the Democratic Republic of Congo

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**Abstract:** This chapter uses 1-2-3 survey data on the Democratic Republic of Congo to analyze heterogeneity in the informal sector. It empirically identifies three types of entrepreneurs in the sector. The first group of entrepreneurs—top performers—is growth oriented and enjoys greater access to capital. The second group—constrained gazelles—includes entrepreneurs who share many characteristics, especially management skills, with the top performers, but operate with less capital. The third group—survivalists—comprises firms struggling to grow. Based on logit and fixed effect ordinary least squares models, the results presented in this chapter show that poverty and income inequality are more common among constrained gazelles and survivalists. The chapter also shows that income inequality is explained mainly by educational disparities and lack of credit access among entrepreneurs. Additionally, the outcomes of a Blinder-Oaxaca decomposition show that the performance of firms is a key factor in explaining differences in income. Examining the drivers of performance, the chapter finds that human capital and managerial skills are important engines of performance.

## **4.1. Introduction**

In 2012, the urban informal sector represented 81.5 percent of employment in the Democratic Republic of Congo (World Bank 2016). This large proportion highlights the sector's critical importance for job creation and income growth in the country. The sector is also vital for the achievement of the twin goals of poverty reduction and shared prosperity, as it tends to offer opportunities to the most vulnerable, namely, the poorest, women, and youth. While the informal sector is defined in various ways in the literature, it is generally said to encompass economic activities that are not subject to taxes and other regulations (De Soto 1989; Loayza 1996). This chapter defines enterprises in the informal sector as enterprises without formal accounting books and national identification numbers as firms. This definition seems more appropriate because it allows for comparability with studies in other developing countries.

Many aspects of the informal economy have been studied. Earlier studies have focused on explaining the reasons underlying the emergence of the informal economy, the productivity of the informal sector, and why firms remain informal. For instance, Johnson, Kaufmann, and Shleifer (1997) and Johnson, Kaufmann, and Zoido-Lobaton (1998) argue that the most striking factors explaining the emergence of informal firms are rigid labor regulations, high registration costs, bribery, and constraints in the delivery of public goods and services. Using data on Latin America, Loayza (1996) finds that the size of the informal sector is negatively correlated with the quality of government institutions and positively correlated with proxies for tax burden and labor market restrictions. Still, little attention has been paid to heterogeneity in the informal sector and even less to inequality within and between the various categories of informal firms. Understanding this heterogeneity and income inequality is crucial to the design of appropriate policies.

This chapter contributes to the empirical literature by analyzing heterogeneity in the informal sector in the Democratic Republic of Congo and the implications for the performance of firms and income inequality. Relying on a representative sample of informal firms derived from the 1-2-3 survey in the country, the chapter identifies three distinct groups of informal entrepreneurs: top performers, constrained gazelles, and survivalists. The first group of entrepreneurs is growth oriented and enjoys a greater access to capital. The second group includes entrepreneurs who share many characteristics, especially management skills, with the top performers, but operate with less capital. The survivalists, entrepreneurs who are struggling to grow, represent the third group. Furthermore, the chapter makes three other major contributions. First, it analyzes poverty and

income inequality among these three distinct categories of firms. Second, using a Blinder-Oaxaca decomposition, it explains income differences across the three groups. Third, it examines the drivers of performance and profitability among informal firms.

The results highlight a striking heterogeneity among informal firms. Poverty rates are higher among survivalists and constrained gazelles than among top performers. Income inequality, which is more common among constrained gazelles and survivalists, is mainly explained by performance gaps, educational disparities, and a lack of credit access. The characteristics of entrepreneurs, such as age, educational attainment, and managerial skills, are important drivers of the quality of the performance of firms.

The rest of the chapter is structured as follows. Section 4.2 reviews the literature on the informal sector. Section 4.3 describes the data and descriptive statistics. Section 4 explains the identification strategy. Section 4.5 compares various characteristics associated with these groups. Section 4.6 investigates urban poverty and inequality among informal firms. Section 4.7 analyzes the drivers of the performance of firms. Section 4.8 provides concluding remarks and policy recommendations.

## **4.2. Informal sector heterogeneity and inequality: Literature review**

The distinction between the formal sector and the informal sector has been studied by various authors over the last four decades. Hart (1973) relies on the distinction between wage and nonwage (self-employment) activities to distinguish the two sectors (see also ILO, 1972). Since then, the debate about the nature of the diversity of formal and informal firms has shifted appreciably. Now, specific attributes and issues in the informal sector tend to vary depending on the region.

In Latin America and in economically dynamic parts of Southeast Asia, discussions about the informal sector focus on whether most informal entrepreneurs would prefer to remain in the informal sector or possess more secure jobs in the formal sector (Maloney, 2004). In Africa, interest has centered on the division between a rather small group of successful firms and a much larger group of firms that struggle to survive. The available evidence tends to confirm that Sub-Saharan Africa is characterized by a dual industrial structure characterized by large numbers of small firms, small numbers of large firms, and few small and medium enterprises (Fafchamps, 1994).

Rogerson (1996) recognizes a conceptual distinction between two groups of informal enterprises. The first group consists of survivalist firms. These are involved in activities initiated by people unable to secure regular wage employment or access to an economic sector of their choice. These firms are characterized by poverty and must struggle to survive. The second group includes microenterprises or growth enterprises that are small. Using empirical data on Costa Rica and Malaysia, Fields (1990) defines the growth-oriented entrepreneurs who can afford financial and human capital as the “upper-tier informal sector.”

The International Labour Organization (ILO 2002) stresses the importance of recognizing the diversity of the workers in the informal economy because these workers have varied needs. In this vein, Nichter and Goldmark (2009) defend their argument that practitioners should be clear about their goals and avoid focusing interventions on the broad-based expansion of micro- and small enterprises. These enterprises are heterogeneous, and the class possesses numerous segments, such as latent gazelles and survivalist middle-size enterprises, making the establishment of common, effective programs across groups difficult. Whereas all such enterprises require assistance through interventions, the latent gazelles are more likely than survivalists to need significantly varied types of assistance.

The empirical literature highlights many features of the heterogeneity in the informal sector, including involuntary wage labor, queuing for formal employment, and voluntary self-employment. These are similar in many ways to the characteristics of the entrepreneurial small firm sector in developed countries (Grimm, Lay, Roubaud and Vaillant, 2011). Fields (2004) differentiates between rationed upper-tier activities, which are based on methods of production and types of jobs that are similar to those of formal firms, and a lower tier, which is concentrated on easy entry activities and corresponding to the residual subsistence sector in the dualistic view (Bosch and Maloney, 2010). However, Cunningham and Maloney (2001), using data on Mexico, argue that there is strong heterogeneity among small firms that is of the same nature as the heterogeneity in developed countries, whereby small firms that have reached their optimal long-run size coexist with profitable starting firms and start-up firms that will fail.

The key policy implication of the existence of distinct groups of entrepreneurs is that these groups call for distinct policy approaches: a directed business development method for top performers and a more widespread program to help improve employability and reduce poverty among the survivalists (Berner, Gomez, and Knorringa, 2012).

Using a sample of informal entrepreneurs in seven West African countries, Grimm, Knorringa, and Lay (2012) in addition to the groups of top performers and survivalists, empirically identify a third segment of informal entrepreneurs, constrained gazelles. These entrepreneurs show characteristics—managerial abilities and motivation—similar to those of growth-oriented entrepreneurs. The authors mostly find a larger share of constrained gazelles in more dynamic economies. They also show that the size of the group of constrained gazelles relative to the group of survivalists is correlated with structural characteristics, such as the urbanization rate, the share of agriculture in the economy, and the size of the public and formal private sectors of the respective countries.

Gindling and Newhouse (2014) investigate heterogeneity among the self-employed, using the international Income Distribution Database (I2D2) on almost 100 developing countries. Unlike Grimm, Knorringa and Lay (2012), this paper uses two different measures of success (a) whether the self-employed worker is an employer and (b) whether the self-employed worker belongs to a family with per capita consumption above the \$2 per day poverty line. The paper relies on the methodology developed in Grimm, Knorringa and Lay (2012) to identify self-employed with a high potential to become successful. Results show that one-third of the unsuccessful entrepreneurs have the potential to become successful.

Using qualitative information, performance-based measures and employment growth, Diao et al. (2016) identified a group of firms in the Micro, Small and Middle-Sized Enterprises (MSME) sector in Tanzania— the so-called “in-between”. These firms operate mainly in the sectors of manufacturing and trade services, employ approximately the same number of employees as compared to those in the formal sector and have significant potential for future growth.

Few studies have specifically investigated inequality in the informal sector. Most that do have focused only on the causality between rising inequality and the size of the informal economy at the macroeconomic level (Chong and Gradstein, 2004; Winkelried, 2005).

Classifying firms in the informal sector and recognizing the sector’s role as a setting environment for profitable activity may contribute to economic growth (AfDB, 2013). Accounting for more than half the labor force in Sub-Saharan Africa, the informal sector represents prospects for better living standards among many people. Nonetheless, there is evidence that registering with tax authorities (formalization) increases the profits of firms with two to five workers and the middle third of capital stock (the midsize group), while leading to losses among smaller and larger

informal firms (McKenzie and Sakho, 2010). Discovering how to reduce inequality and poverty between and within the three distinct categories of informal firms—top performers, constrained gazelles, and survivalists—is thus an important policy matter. It could enhance the productivity of firms and help governments coordinate strategies and policies to support the formalization of the sector.

## **4.3. Data and descriptive statistics**

### **4.3.1. 1-2-3 survey**

The empirical investigation reported in this chapter relies on survey data from the 1-2-3 survey collected in the Democratic Republic of Congo in 2012. The 1-2-3 survey was conducted by the National Institute of Statistics, in partnership with other actors, including Afristat and the World Bank.<sup>38</sup> The 1-2-3 survey is a representative, multilayer survey that covers three nested surveys, three phases involving separate statistical populations: individuals, informal production units, and households.

Phase 1 provides detailed information on employment, unemployment, and household and individual sociodemographic characteristics. It includes a household module, an individual questionnaire for individuals ages 5 or above, and a community questionnaire. Phase 2 is a specific survey covering the heads of informal production units. This informal sector survey collects information on the characteristics of firm owners, production units, economic performance, business requirements (costs, investment), and employees. This phase is important as it allows measuring the Congolese informal economy. Phase 3 is a survey on household expenditures that involves interviews among a subsample of the informal production units identified in phase 1. The chapter focuses on a representative subsample of 4,504 informal firms. Table C1 in the appendix C defines the variables used in the chapter.

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<sup>38</sup> See INS. <http://www.ins-rdc.org/sites/default/files/Rapport%20enquete%20123.pdf>.



### **4.3.2. Characteristics of the informal sector in DRC**

The informal sector in the Democratic Republic of Congo is heterogeneous in many ways. Differences are noticeable across the individual characteristics of the owners of informal firms (reason for the creation of the firm, educational attainment), but also across the distribution of consumption<sup>39</sup> and capital.

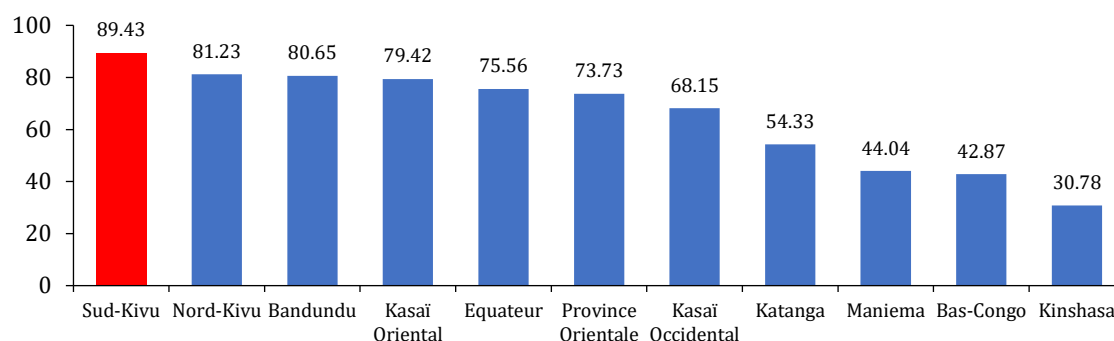
Most people who have created informal enterprises have done so because they lack alternative employment opportunities. Many entrepreneurs started their businesses because they could not find jobs in the formal wage sector. Of entrepreneurs who have created their own businesses because of the lack of jobs in large firms, 63 percent have received secondary education, 65 percent are men while only 35 percent are women (appendix, Figure C1). The informal sector is dominated by women entrepreneurs, who own approximately 64 percent of all informal firms. This reinforces the finding that, in many developing countries, women manage the majority of small and medium enterprises because they lack access to alternative opportunities (Rubio 1991).

The vast majority of entrepreneurs in the informal sector are poor. Poverty incidence is high among workers in the sector as well. An average 61 percent of informal entrepreneurs are poor, compared with the nationwide poverty incidence, which is 64 percent. However, the incidence of poverty among workers in the informal sector varies dramatically by province. For example, 31 percent of entrepreneurs in Kinshasa are poor, compared with approximately 90 percent in Sud-Kivu (Figure 4.1). There also are striking differences across the provinces in the sociodemographic characteristics of entrepreneurs in the informal sector.

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<sup>39</sup> The rest of the chapter uses consumption as a proxy for income and will use the two interchangeable terms.

**Figure 4.1. Poverty Incidence among informal Entrepreneurs by province, 2012 (%)**



Source: Calculations based on 1-2-3 Survey data.

Most of the entrepreneurs in the informal sector have received education. Respectively, 59 percent and 14 percent have attained secondary and postsecondary education. Only 7 percent have no formal education, while 16 percent have completed primary education (Table 4.1).

There is a strong correlation between educational attainment and poverty status because informal entrepreneurs with higher consumption levels tend to be more educated. Approximately 40 percent of informal entrepreneurs who possess postsecondary education rank among the informal entrepreneurs with the highest consumption (top quintile). Only 12 percent of the informal entrepreneurs who have no formal education have reached such consumption. Meanwhile, approximately 6 percent of entrepreneurs with postsecondary education exhibit consumption that ranks in the bottom consumption quintile, where approximately 24 percent of the entrepreneurs with no formal education are found. Educational attainment correlates positively with consumption because the relatively more educated entrepreneurs are more well off (see Table 4.1).

**Table 4.1. Consumption Distribution across Informal Firms**

	All	Bot. decile	1st qt.	2nd qt.	3rd qt.	4th qt.	5th qt.	Top decile
<b>Owner characteristics</b>								
Male	0.364	0.427	0.394	0.387	0.325	0.327	0.391	0.376
Age owner	0.378	0.385	0.383	0.375	0.373	0.380	0.382	0.387
No diploma	0.077	0.083	0.240	0.273	0.204	0.166	0.118	0.080
Primary completed	0.165	0.107	0.224	0.293	0.208	0.140	0.135	0.060
Some secondary	0.588	0.055	0.137	0.227	0.212	0.214	0.210	0.095
Post secondary	0.143	0.024	0.060	0.130	0.165	0.261	0.385	0.221
Other post primary	0.026	0.023	0.129	0.218	0.190	0.259	0.205	0.137
Can read	0.888	0.818	0.809	0.856	0.865	0.927	0.961	0.964
Can write	0.878	0.806	0.798	0.858	0.857	0.908	0.947	0.940
Poor	0.611	0.099	0.243	0.376	0.333	0.048	0	0
<b>Firm characteristics</b>								
Annual value added	4,304,138	1,916,232	1,623,570	1,457,256	13,900,000	2,124,842	2,408,441	2,956,779
Physical capital	145,255.6	54,340.23	75,616.27	95,276.93	131,650	138,510.2	279,270.4	327,061.7
Gross operating profit	125,703.4	115,867.2	106,092.7	99,184.71	129,174.5	130,322.6	163,759	181,338.4
Workers, total	1.3	1.41	1.31	1.24	1.27	1.3	1.37	1.44
Paid workers	0.14	0.2	0.11	0.08	0.13	0.17	0.18	0.25
Wage worker, male	0.23	0.186	0.189	0.166	0.366	0.182	0.271	0.328
Wage worker, female	0.13	0.082	0.11	0.119	0.157	0.146	0.198	0.286
Water	0.0845	0.0202	0.0393	0.1867	0.1857	0.2326	0.3557	0.2343
Electricity	0.1201	0.0296	0.0396	0.1291	0.1844	0.2192	0.4277	0.2358
Land line, phone	0.1534	0.0395	0.0987	0.1474	0.2252	0.2114	0.3174	0.1832
Fixed location	0.5797	0.0508	0.1317	0.2349	0.2039	0.2167	0.2128	0.1041
Mobile location	0.4051	0.0729	0.1722	0.2244	0.2012	0.1902	0.212	0.1087
Other location	0.0152	0.129	0.1605	0.2019	0.2474	0.1599	0.2303	0.062
Observations	4,424	440	1,002	1,007	864	840	711	346

*Source:* Calculations based on 1-2-3 survey data

*Note:* This table considers 4,424 informal firms as there are 80 missing points in our variable per equivalent adult consumption. Means of characteristics of interest are presented in the table. Means are weighted using sampling weights.

The staff size of urban informal firms varies widely, but most of the firms are staffed by only the owner. Figure C2 (in appendix) illustrates the distribution of informal firms by staff size. It shows that 82 percent of entrepreneurs in the informal sector are staffed by one person. Whereas 11 percent of informal firms are staffed by two people, only around 7 percent have from two to five employees.<sup>40</sup> The distribution of the staff size of informal firms by gender shows that 87 percent

<sup>40</sup> About 93 percent of informal firms were created by one person. This may indicate a high potential for cooperatives.

The mean of paid employees is 0.14 (Table 4.1), which is below the share (0.205) found in Grimm, Knorringa and Lay (2012) using 1-2-3 survey data for seven West African countries.

of firms owned by women are staffed by one person while this is the case for 72 percent of firms owned by men (appendix, Figure C3).

Approximately 65 percent of informal firms are active in the agroindustry and food trade, retail trade, and repair services. The breakdown among these branches indicates that 38 percent of entrepreneurs operate in the agroindustry and food trade, while 26 percent have retail shops and repair services. The manufacturing branch represents a minority, with 10 percent of all informal firms. The wholesale, construction, and mining branches each represents less than 2 percent of informal firms (appendix, Table C2).

About 85 percent of entrepreneurs in the informal sector work from a fixed place of business, whereas 15 percent do not. However, the locations of the fixed places of business often do not meet basic requirements in a way that sustains business growth. Informal entrepreneurs without a fixed workplace tend to be mobile. Home is the most common workplace among entrepreneurs who work from a fixed place. However, 21.7 percent of informal entrepreneurs who work from their homes do not have the appropriate equipment (appendix, Figure C4).

The majority of informal firms lack access to basic infrastructure such as water, electricity, and telecommunication. Only 8 percent, 12 percent, and 15 percent of the firms, respectively, have access to water, electricity, and telecommunication. Entrepreneurs in the bottom quintile of the consumption distribution have less access to basic infrastructures mainly because they are less likely to have a fixed workplace compared with entrepreneurs in the top quintile of the consumption distribution (see Table 4.1).

Access to basic infrastructure and a fixed workplace is more constrained among women entrepreneurs than among men entrepreneurs. Whereas 24 percent of men entrepreneurs have access to telecommunication, only 10 percent of women entrepreneurs have such access. Similarly, relative to men entrepreneurs (12 percent), more women entrepreneurs (27 percent) operate from their homes without the appropriate infrastructure (appendix, Figure C5).

The performance of informal firms is related to their access to capital and the source of their labor. Firms with large amounts of capital generate the most profits. Such firms are disproportionately concentrated among entrepreneurs who exhibit high consumption. Highly productive firm owners tend to have at least one wage worker (see Table 4.1). Firm characteristics and performance vary according to the socioeconomic characteristics of the owner.

The average performance of informal firms, measured by the hourly value added, is CGF (Congolese Franc) 20,697.02, and the average amount of capital is CGF 145,255.60. Both firm performance and access to capital vary by gender. Overall, informal firms owned by men tend to perform better. These firms are more likely to have access to more capital and to generate more value added per hour worked relative to informal firms headed by women. Man-headed informal firms typically have more workers who are paid. The informal firms with the most capital are active more often in transport, mining and other primary activities in production and the retrieval of raw materials, construction, and hotels and restaurants. Around 42 percent of informal firms in the top capital decile are engaged in transport. Informal firms operating in the food trade, agribusiness, and wholesale tend to have the least access to capital (appendix, Table C2).

In general, the richer the entrepreneur, the better the economic performance. Larger hourly value added is generated by entrepreneurs with higher levels of consumption compared with their counterparts in the bottom consumption quintile. Informal entrepreneurs in the bottom income decile exhibit lower value added, about two-thirds as much as the entrepreneurs in the top decile.

Entrepreneurs with greater capital are typically more well educated. Over a third of the entrepreneurs with greater access to capital (the top quartile) have received vocational education, that is, other post-primary education. Only 11 percent of the entrepreneurs in the bottom quartile of the capital distribution have received so much training. Around 36 percent of the entrepreneurs in the top quartile of the capital distribution have some postsecondary education compared with 19 percent of the entrepreneurs in the bottom quartile (appendix, Table C3).

Informal firms with less capital are more constrained by a lack of basic infrastructure (water, electricity, and phone lines) than their peers. Firms in the bottom quartile of the capital distribution have less access to basic infrastructure. While close to a third of these firms operate from mobile locations, this is true of only a fifth of the firms in the top capital quartile (appendix, Figure C6). Informal firms in provinces such as Katanga and Kinshasa tend to have access to more capital and better access to water and electricity (appendix, Table C2).

## **4.4. Identification strategy: Informal firms**

### **4.4.1. Defining a top performer**

Following Grimm, Knorringa, and Lay (2012), the strategy to identify the three categories of informal entrepreneurs involves three steps. The first step consists in defining growth-oriented entrepreneurs or top performers in terms of physical capital and value added. Physical capital is defined as the replacement value of all business-related assets that have been used in the operation of the enterprise in the previous year, including the business establishment, machinery, furniture, vehicles, and utilities. In the second step, owner and firm characteristics are identified that are correlated with physical capital and value added, and the empirical probability that a firm will be highly productive is assessed based on these correlations. In the third step, entrepreneurs are classified into the three groups—top performers, constrained gazelles, and survivalists—conditional on the actual status as a top performer and the predicted probability of this status.

The chapter defines top performers as those entrepreneurs in the sample who are the most productive (the top 50 percent in terms of capital productivity, that is, value added per physical capital) among the top 40 percent of the capital distribution. Because capital accumulation is part of the economic growth process, it is considered an accurate factor in identifying a growth-oriented firm.

### **4.4.2. Sample selection bias**

Because of missing values in the variable of capital and because the definition of the top performers is based mainly on this variable, the Heckman (1979) two-step estimation is viewed as a reliable way to test for selection bias. The first step consists in analyzing the determinants of capital possession. To do so, a probit model is estimated, as the follows:

$$\Pr(\text{Capital} = 1) = \theta(\alpha_0 + X_i' \alpha_1 + \omega_i) \quad (4.1)$$

where *capital* is a dummy variable taking 1 when a firm owns capital and 0 otherwise;  $\theta$  is the cumulative standard distribution function;  $X_i$  is a vector of the following factors: business association, financial knowledge that is measured by a variable equal to 1 if the firm's owner has knowledge about microfinance institutions and 0 otherwise, family tradition taking 1 if the owner started a business because of family tradition, the age of the owner, the age squared; a gender

dummy equal to 1 if the owner is a man and 0 otherwise, and firm age. Dummies are included for sectors. The equation also includes region fixed effects.

The results show that membership in a business association, the possession of financial knowledge, and being a man increase the probability of owning capital (Table 4.2). They also support the evidence that industry is a highly capital-intensive sector. Entrepreneurs in the industry sector are more likely (around 6.7 percent) than entrepreneurs in other sectors to have capital. Entrepreneurs operating in hotels and restaurants are also likely to own capital. Entrepreneurs in retail trade and in repair services show less likelihood of capital ownership.

**Table 4.2. Determinants of Capital Ownership among Firms**

	(1) Coefficients	(2) Marginal effects
Business association	0.209*** (0.0972)	0.0548
Financial knowledge	0.151*** (0.0585)	0.0397
Family tradition	0.104 (0.0896)	0.0273
Male(=1)	0.0887* (0.0522)	0.0233
Age firm	0.00571 (0.0129)	0.00150
Age owner	0.00370 (0.00805)	0.000972
Age squared owner	-0.000 (0.000)	-0.000
Constant	0.802*** (0.184)	
Sector fixed effects	yes	
Region fixed effects	yes	
Pseudo-R2	0.1138	
Observations	4,410	4,410
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

In the next step, the chapter derives the predicted probabilities from the estimation of equation (4.1) to calculate the inverse Mills ratio, that is, the ratio of the probability density function to the cumulative distribution function, as follows<sup>41</sup>:

$$\widetilde{MR} = \frac{\phi(X'_i \alpha_1 / \sigma_\omega)}{\Phi(X'_i \alpha_1 / \sigma_\omega)}. \quad (4.2)$$

<sup>41</sup> Box C1 (in appendix C) provides a detailed explanation about the inverse Mills ratio, the probability density and the cumulative distribution functions.

The chapter then includes this ratio in estimating the following equation:

$$\Pr(Y_i^{\text{Top}} = 1) = \theta(\beta_0 + X_i'\beta_1 + \mu\widetilde{\text{MR}} + \omega_i) \quad (4.3)$$

where  $Y_i^{\text{Top}}$  is the binary variable indicating a firm that is a top performer;  $\theta$  is the cumulative distribution function of the logistic distribution;  $\beta_1$  is the vector of coefficients that defines the link between owner and firm characteristics and the probability that the firm is a top performer; and  $X_i$  is the vector of owner and firm characteristics. The vector  $X_i$  encompasses the predetermined factors that are correlated with identity as a top performer. To address the issue of endogeneity, predetermined variables are included, as follows: age, age squared, gender, educational attainment, and the motivation of the entrepreneur to set up the business, which is measured by a dummy variable taking the value of 1 if the entrepreneur created the firm because s/he could not find a paid job in a large company. Besides these predetermined variables, which allow to control for the firm's age and avoid selection against younger firms with a high potential, a sector dummy is included.

Table 4.3 displays the estimation results. It highlights that men have a greater chance (5.2 percent) than women of being top performers. In addition, the probability of inclusion as a top performer rises with age, albeit at a decreasing pace. Vocational training is a key determinant of being a top performer. Individuals who have started businesses because they could not find jobs in large firms exhibit a higher probability (approximately 4.2 percent) of inclusion among the top performers. Moreover, the inverse Mills ratio is not significant, that is, there is no selection bias in the model estimation.



**Table 4.3. Step 2: Probability of being a Top Performer**

	(1) Coefficients	(2) Marginal effects
Age owner	0.117*** (0.0287)	0.00878
Age squared owner	-0.00142*** (0.000352)	-0.000107
Male(=1)	0.701*** (0.156)	0.0528
Age firm	0.0239 (0.0426)	0.00180
No diploma	Ref.	
Primary completed	0.128 (0.399)	0.00740
Some secondary	0.439 (0.311)	0.0288
Post-secondary	0.599 (0.374)	0.0419
Other post primary	1.057** (0.432)	0.0886
No opportunity in large firms	0.564*** (0.183)	0.0424
Family tradition	0.171 (0.266)	0.0129
Inverse Mills ratio	-2.129 (1.341)	-0.160
Constant	-4.769*** (0.924)	
Sector fixed effects	yes	
Region fixed effects	yes	
Pseudo-R2	0.08	
Observations	3,401	3,401

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 4.4.3. Identification of the constrained gazelles and survivalists

Based on regression (4.3), the chapter predicts, for each entrepreneur in the country, the statistical probability of being a top performer. This probability is conditional on the estimated parameters  $\beta_0$  and  $\beta_1$  and on the vector of observed variables  $X$ . The following model is performed:

$$\widehat{\Pr}(Y_i^{\text{Top}} = 1) = \theta(\hat{\beta}_0 + X_i' \hat{\beta}_1) \quad (4.4)$$

where  $\hat{\beta}$  is the vector of estimated coefficients. To separate the sample of informal entrepreneurs into three categories: top performers, constrained gazelles and survivalists, the chapter uses these predicted probabilities.

To determine the shares of the other segments, the cut-off point is selected for  $\widehat{\Pr}(Y_i^{\text{Top}} = 1)$  between constrained gazelles – a group of entrepreneurs who have business skills that resemble in many respects those of the top performers but are clearly different from those skills characterizing survivalists – and survivalists such that the mean of this predicted probability is similar in the group of top performers and the group of constrained gazelles. This suggests that the distribution

of the observable factors is the same in both categories and that on average constrained gazelles should be as likely as the actual top performers to be top performers. The survivalists are defined as all entrepreneurs for whom  $\widehat{\Pr}(Y_i^{\text{Top}} = 1)$  is below the threshold.<sup>42</sup>

Estimates based on equation (4.3) illustrate that constrained gazelles and top performers share some characteristics. Table C5 (in appendix) illustrates the determinants of inclusion among the three distinct groups of informal firms that have been identified. The results show that firms managed by men, people who created businesses because they could not find jobs as wage earners in large firms, more well educated, and older people have a higher probability of being constrained gazelles. However, these determinants also decrease the probability of being survivalists.

Table 4.4 and Figure 4.2 show the shares of the three groups of informal entrepreneurs by province. One may note that, whereas almost 26 percent of the constrained gazelles are located in Kinshasa, only 1 percent are based in Sud-Kivu. Katanga and Kinshasa, where firms are the least constrained by the lack of basic infrastructure and the most highly endowed in capital, are the provinces with the most top performers and constrained gazelles.

Table 4.5 presents the shares of top performers, constrained gazelles and survivalists within province. Within province, most of entrepreneurs are either survivalists or constrained gazelles. Among entrepreneurs in Sud-Kivu, 78 percent are survivalists. In Kinshasa, more than a half of entrepreneurs are constrained gazelles. In Equateur, 16 percent of entrepreneurs are top performers whereas in only 4 percent of entrepreneurs in Nord-Kivu are top performers.

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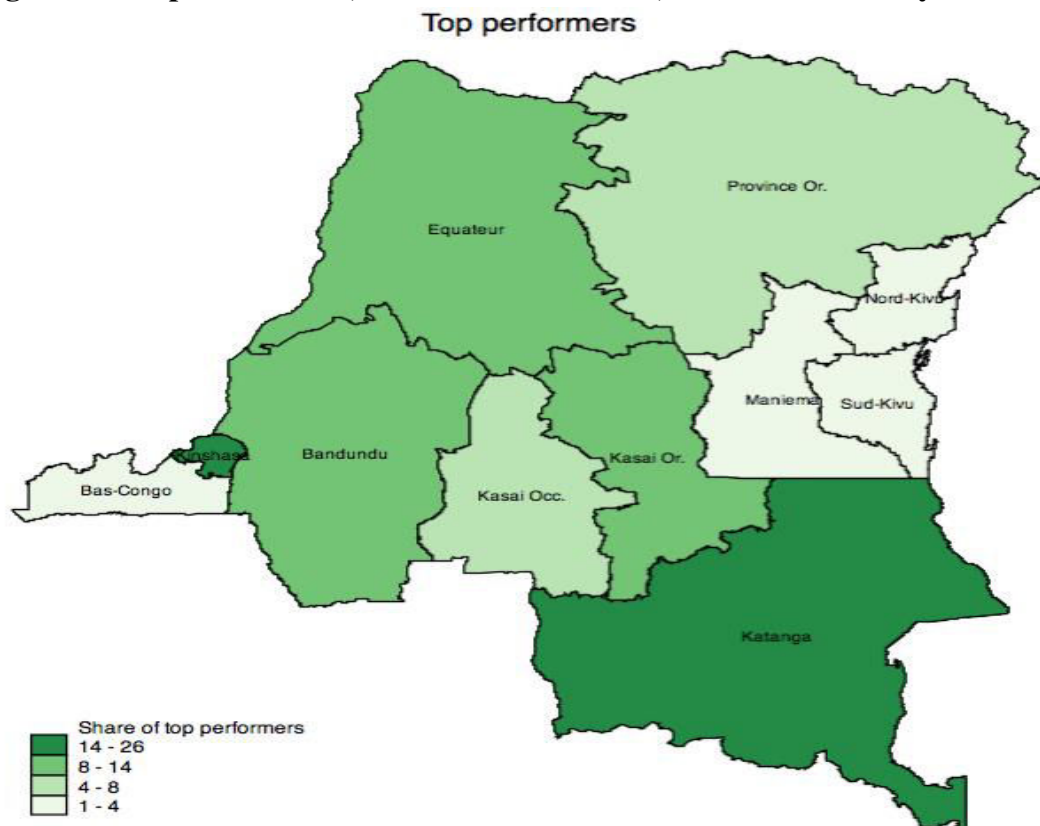
<sup>42</sup> As a robustness check, the chapter relies on the full information maximum likelihood (FIML) model to estimate equation (4.3). The FIML model handles missing values problems well by using all the information available. The results remain unchanged (appendix, Table C4). The two groups (constrained gazelles and survivalists) are then reclassified using the predicted probabilities based on the model regressions. The groups of constrained gazelles and survivalists using Heckman (1979) two step and FIML estimations match at about 96 percent.

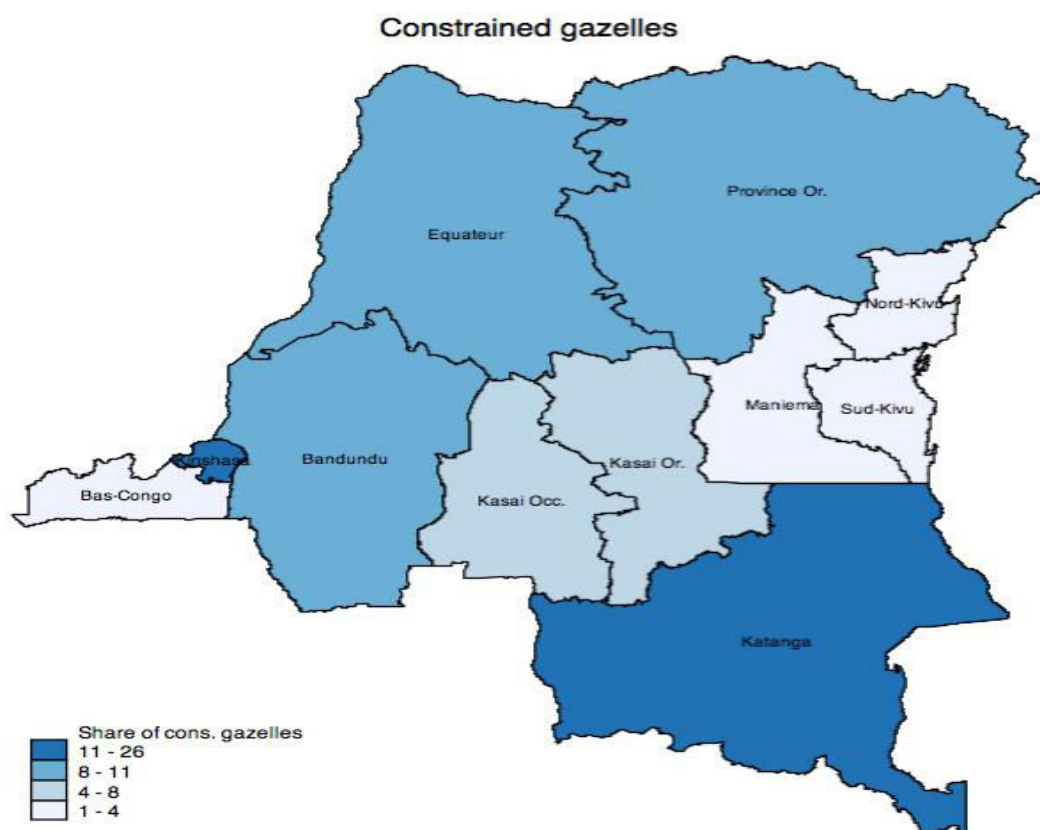
**Table 4.4. Percentage Share of Firms, by Province**

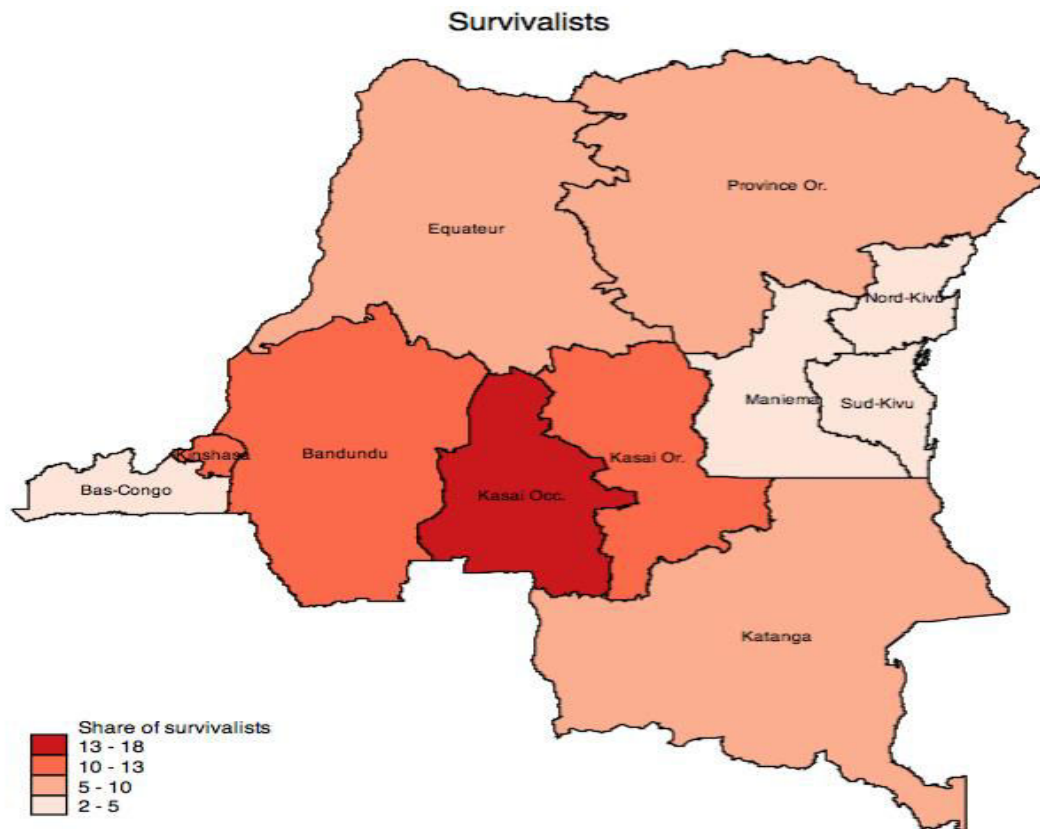
	Top performers	Constrained gazelles	Survivalists
Equateur	13.68	9.47	6.90
Bandundu	8.88	10.14	13.31
Bas-Congo	3.74	4.09	5.14
Katanga	15.83	16.98	10.40
Kasaï Oriental	10.46	7.54	10.53
Kasaï Occidental	8.37	8.39	18.21
Kinshasa	25.66	25.96	13.37
Nord-Kivu	1.36	1.75	4.39
Sud-Kivu	3.78	1.03	5.30
Maniema	1.67	3.62	2.46
Province Orientale	6.57	11.03	9.97

*Source:* Calculations using 1-2-3 surveys. Percentages are weighted using sampling weights

**Figure 4.2. Top Performers, Constrained Gazelles, and Survivalists by Province, 2012 (%)**







**Table 4.5. Percentage Share of Firms, within Province**

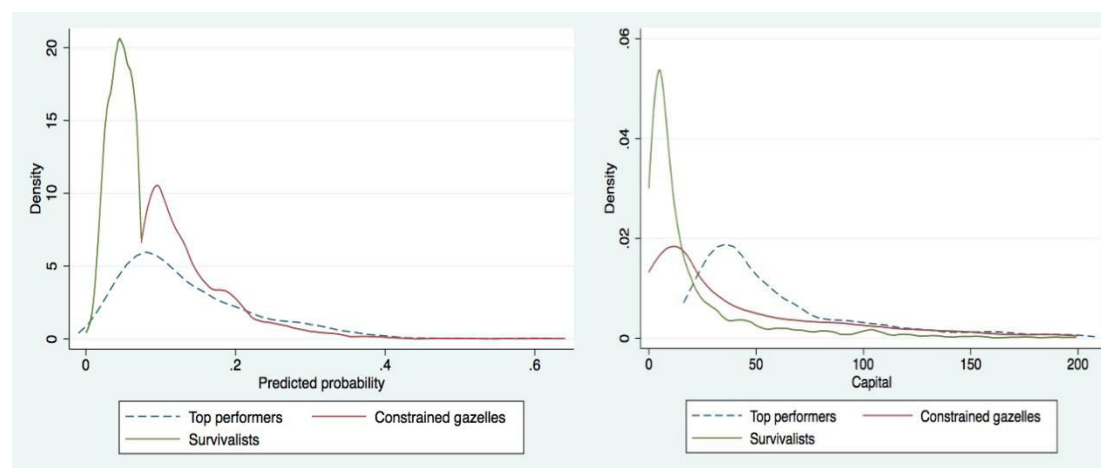
	Top performers	Constrained gazelles	Survivalists
Equateur	15.98	41.69	42.33
Bandundu	7.6	32.68	59.73
Bas-Congo	8.11	33.4	58.49
Katanga	11.78	47.61	40.61
Kasaï Oriental	11.11	30.18	58.71
Kasaï Occidental	6.18	23.32	70.5
Kinshasa	13.25	50.51	36.24
Nord-Kivu	4.4	21.25	74.35
Sud-Kivu	10.65	10.97	78.38
Maniema	5.92	48.38	45.7
Province Orientale	6.54	41.38	52.07

*Source:* Calculations using 1-2-3 surveys. Percentages are weighted using sampling weights

To check the consistency of the method of determining the three groups of entrepreneurs, the distribution of predicted probabilities is plotted for the top performers, survivalists, and constrained gazelles. Figure 4.3 shows that the distribution among survivalists is dissimilar relative to the distribution within the two other groups. It also displays the distribution of capital: top performers and constrained gazelles possess more capital than survivalists. This confirms the results of the analysis.

**Figure 4.3. Distributions across informal firms**

- a. Distribution of predicted probability of being a top performer      b. Distribution of capital



## **4.5. Heterogeneity in the informal sector**

Assessing differences among top performers, constrained gazelles, and survivalists helps identify the best policy design for each category. This section considers three features—individual entrepreneurial characteristics, choice of sector, and firm characteristics. Constrained gazelles and top performers might be expected to exhibit similar basic management characteristics that align with how this analysis defined the two groups. Table 4.6 shows comparison results.

### **4.5.1. Individual entrepreneur characteristics**

The incidence of poverty in the Congolese informal sector is high. Among Congolese entrepreneurs, 61 percent are poor. However, the incidence of poverty varies across the distinct groups of entrepreneurs. It is lower within top performers than within the two other groups. About 57 percent of top performers are poor whereas respectively 64 percent and 73 percent of constrained gazelles and survivalists are poor. Policies that aim to improve the well-being of poor informal workers should thus target the survivalists and constrained gazelles.

The survivalist businesses are owned overwhelmingly by women; top performer and constrained gazelle businesses are owned primarily by men. Gender-based disparity in the informal sector is more noticeable by type of firm. Survivalist informal firms are mostly woman-owned (87 percent). Women own 42 percent and 29 percent, respectively, of top performers and constrained gazelles (see Table 4.6). In contrast, man-owned firms are more likely to be top performers or firms with the capacity to become top performers, that is, constrained gazelles.

Educational differences are pronounced, with top performers and constrained gazelles more highly educated than survivalists. The difference in educational attainment between top performers and constrained gazelles is not statistically significant. However, there is a noticeable difference between the educational attainment of top performers and survivalists. While 14 percent of top performers have a postsecondary education, only 8 percent of survivalists have attained this level. Survivalists have the lowest overall educational attainment.

Vocational training correlates positively with the performance of informal firms. This correlation may provide a useful link between education and firm performance. Through better education and training, entrepreneurs may develop greater capability, acquire new management and marketing skills, and learn efficient production processes (Tan and Batra 1995; Burki and Terrell 1998).

**Table 4.6. Comparison across Top Performers, Survivalists, and Constrained Gazelles**

	(1) Top performers	(2) Constrained Gazelles	(3) Survivalists	(4) t-Test (1) vs (2)	(5) t-Test (1) vs (3)	(6) t-Test (2) vs (3)
<b>Basic owner characteristics</b>						
Age owner	37.753	38.132	36.582	0.5606	0.1994	0.001***
Male (=1)	0.58	0.712	0.132	0.000***	0.000***	0.000***
No diploma	0.046	0.034	0.119	0.2983	0.000***	0.000***
Primary completed	0.11	0.098	0.231	0.5264	0.000***	0.000***
Some secondary	0.658	0.666	0.561	0.7969	0.001***	0.000***
Post-secondary	0.140	0.158	0.082	0.4481	0.001***	0.000***
Other post-primary	0.043	0.042	0.005	0.9606	0.000***	0.000***
No opportunity in large firms	0.201	0.195	0.026	0.8320	0.000***	0.000***
No opportunity in small firms	0.110	0.148	0.133	0.091*	0.2846	0.222
Poor	0.568	0.644	0.733	0.014**	0.000***	0.000***
<b>Firms characteristics and Sector</b>						
Size of firm	1.756	1.496	1.191	0.001***	0.000***	0.000***
Paid workers	0.45	0.2178	0.0565	0.0003***	0.000***	0.000***
Age of firm	2.263	2.295	2.03	0.7657	0.021**	0.000***
Value added	7,755,333	1,789,103	1,049,235	0.000***	0.000***	0.000***
Capital <sup>1/</sup>	64,342.53	57,903.35	28,567.01	0.2135	0.000***	0.000***
Turnover	31,400,000	5,315,526	3,893,473	0.0001***	0.000***	0.000***
Gross operating profit	7,028,248	1,533,952	996,596.9	0.000***	0.000***	0.000***
Food/Agribusiness	0.23	0.184	0.532	0.073*	0.000***	0.000***
Clothing and apparel	0.083	0.104	0.054	0.2726	0.047**	0.000***
Industry	0.156	0.162	0.147	0.811	0.6747	0.2503
Construction	0.03	0.033	0.001	0.787	0.000***	0.000**
Transport	0.026	0.033	0.025	0.528	0.910	0.1721
Hotels and restaurants	0.08	0.049	0	0.037**	0.000***	0.000***
Wholesale	0.02	0.018	0.005	0.889	0.006***	0.000***
Primary and mining	0.046	0.048	0.014	0.874	0.000***	0.000***
Retail and repair services	0.266	0.290	0.172	0.4046	0.000***	0.000***
Other activities	0.06	0.073	0.046	0.407	0.3232	0.001***
<b>Structural and behavioural factors</b>						
Firm set up with other person	0.256	0.216	0.115	0.1306	0.000***	0.000***
By family tradition	0.087	0.09	0.077	0.7995	0.5736	0.1553
Firm has a location	0.116	0.081	0.034	0.049**	0.000***	0.000***
Mobile location	0.146	0.152	0.165	0.7986	0.4046	0.3126
Fixed location on the street	0.176	0.170	0.126	0.7998	0.018**	0.000***
Firm located at home	0.313	0.349	0.423	0.2352	0.000***	0.000***
Firm located at clients' home	0.033	0.048	0.017	0.2471	0.065*	0.000***
Fixed location on market	0.033	0.033	0.015	0.9808	0.027**	0.000**
Improvised location on market	0.183	0.160	0.210	0.3420	0.2734	0.000***
Shop/restaurant	0.03	0.027	0.013	0.7781	0.027**	0.004***
Other location	0.083	0.057	0.027	0.099*	0.000***	0.000***
Water connection	0.083	0.068	0.049	0.3663	0.016**	0.023**
Electricity connection	0.133	0.142	0.053	0.6896	0.000***	0.000***
Telecommunication	0.2	0.202	0.077	0.9253	0.000***	0.000***
Self-employment/Firm is staffed by one person	0.656	0.752	0.878	0.000***	0.000***	0.000***
Trade register	0.016	0.024	0.006	0.4009	0.0672*	0.000***
Financial knowledge	0.216	0.228	0.143	0.6520	0.001***	0.000***
Member of a business association	0.113	0.101	0.051	0.5468	0.000***	0.000***
Active reaction to demand shocks	0.786	0.735	0.744	0.081*	0.1355	0.6018
Risk aversion	0.164	0.124	0.114	0.065*	0.015**	0.4055
Observations	300	1331	1839			

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. <sup>1/</sup> Few outliers have been dropped.



#### **4.5.2. Firm typology and the choice of sector**

More than 50 percent of survivalists are engaged in food trade and agribusiness compared with only 23 percent of top performers and 18.4 percent of constrained gazelles. This sector comprises for instance retail trades of palm oil, tomatoes and other agricultural products. The primary sector of top performers and constrained gazelles (26.6 percent and 29.0 percent, respectively) is repair services and the retail trade, which includes retail trade in coal, fuel, and kitchen appliances and the repair of bicycles, motorcycles, and household items. Our results are similar to those of Gindling and Newhouse (2014). Their results show that the successful self-employed are more likely to operate in retail and services compared to unsuccessful self-employed.

Top-performing firms are generally larger than constrained gazelles and survivalists. Top performing firms are approximately 20 percent larger than constrained gazelles and almost 50 percent larger than survivalist firms. Firm size is measured as the total number of paid and non-paid workers. In addition, the number of paid workers is significantly higher in top-performing firms than in the two other types of firms. This suggests that constrained gazelles and survivalists tend to employ more non-paid workers (mainly family members) as compared to the top performers.

Constrained gazelles are generally older than both top performers and survivalists, and survivalists are, on average, the youngest of the three groups. This age dimension may reflect accumulated business experience. Firms may also experience both positive and negative shocks during their existence. The learning-by-doing channel enables firms to learn and to perform better as they age, making them more likely to survive (Baker and Kennedy, 2002). However, older firms in developing countries may suffer from productivity losses, for example, if their owners become too old to adopt new technologies (Burki and Terrell, 1998; Nichter and Goldmark, 2009).

Other firm characteristics tend to be significantly different when top-performing firms, constrained gazelles and survivalists are compared. Top performers generate significantly higher value added, sales turnover and gross operating profit as compared to constrained gazelles and survivalists. For instance, sales turnover averages more than CGF 31 million. This number compares with only CGF 5 million for constrained gazelles and CGF 3 million for survivalists. This suggests that the three types of firms may differ in terms of their behavior in managing controlling their firm.

### **4.5.3. Structural and behavioral factors**

This section examines structural and behavioral factors that could explain why top performers, constrained gazelles and survivalists differ.

Setting up an informal firm with more than one owner may reduce credit market constraints. Enterprises with multiple owners are more likely to be top performers or constrained gazelles. About 26 percent of the top performers have founded their businesses as joint ventures. About 22 percent of constrained gazelles have done so while only 11 percent of survivalists are joint ventures. About 9 percent of top-performing firms and constrained gazelles have been created by family tradition. 7 percent of survivalists have been created by family tradition. While top performers and constrained gazelles are not significantly different, the two types of firms differ significantly from survivalists in terms of being joint ventures and created because of a family tradition.

Top performers and constrained gazelles tend to operate from fixed locations (streets, markets, shops), while survivalists tend to operate from home and mobile selling points. The transitory locations of survivalists may explain the greater constraints the survivalists face in taking advantage of basic infrastructure. In addition, a higher share of top-performing firms has locations as compared to constrained gazelles and survivalists. The three firms are clearly different in terms of operating from a location. Constrained gazelles and survivalists are more constrained in terms of location than top performers. However, top performers and constrained gazelles are close in terms of access to basic infrastructure while they are clearly different from survivalists.

Survivalists possess less financial knowledge, are less likely to register their businesses, and are less likely to be involved in a business association than either of the other two groups. Top performers and constrained gazelles are not significantly different in these characteristics. This highlights that top performers and constrained gazelles share some similar management skills and professional networks. Yet, the owners of the two types of firms differ in terms of other management skills – their owners’ active reaction to demand shocks and their aversion to risks. The chapter constructs two dummy variables to assess (1) the active reaction of entrepreneurs to demand shocks and (2) the risk aversion of entrepreneurs. The first dummy variable equals 1 if in response to an important decline in demand, the entrepreneur reduces his/her profit, increases and/or diversifies the quality of products. The second dummy variable equals 1 if the motivation of the entrepreneur to take up his/her current activity is – the assurance of more stable receipts than

in other products. Table 4.6 shows that the owners of top-performers tend to be more reactive to demand shocks than constrained gazelles and survivalists. The owners of top-performing firms are also more averse to risks as compared to the two other types of informal firms.

#### **4.6. Urban poverty and income inequality in the informal sector**

Poverty and income inequality are particularly significant in the informal sector. This section examines these two issues among the three distinct groups of informal firms.

Table 4.7 shows the distribution of quintile of income by informal firms. The top performers are better off than the other categories of informal firms. While more than 17 percent of survivalists are in the bottom quintile of revenue only respectively 13 percent of constrained gazelles and 9 percent of top performers are found in this quintile. Moreover, the logit estimates of the probability of being poor confirm that survivalists and constrained gazelles are more likely to be poor than top performers (Table 4.8).<sup>43</sup>

**Table 4.7. Quintiles of Per Adult Equivalent Consumption, Informal Firms, %**

Quintiles of consumption	Top performers	Constrained Gazelles	Survivalists
1	8.94	12.85	17.55
2	18.43	21.17	26.23
3	21.37	17.17	21.94
4	23.04	21.47	19.66
5	28.23	27.35	14.63
Total	100	100	100

*Source:* Calculations using 1-2-3 Survey data

*Notes:* Percentages are weighted using sampling weights.

<sup>43</sup>These results are robust to two other classification methods (using the mean in capital and in value added per hour worked) for the three groups of informal firms.

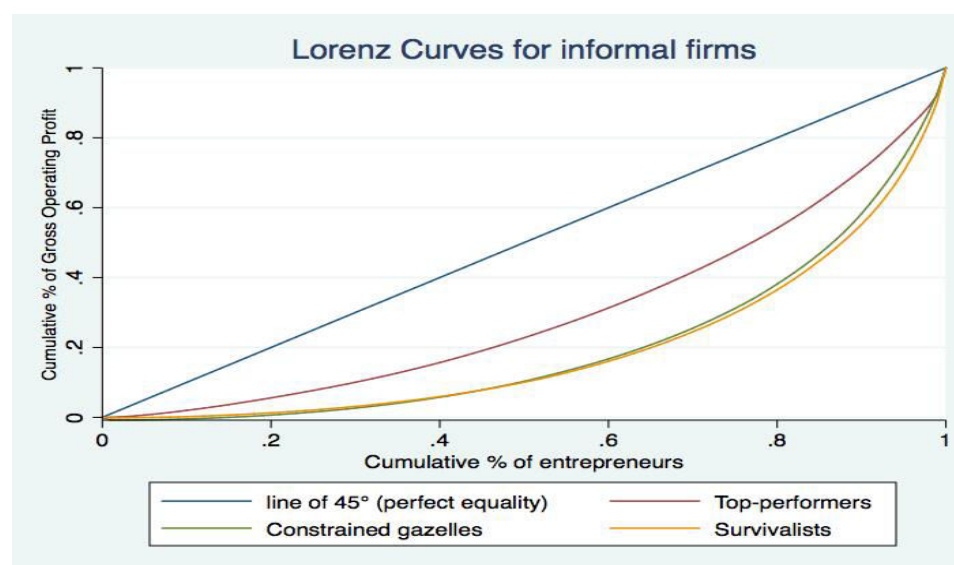
**Table 4.8. Poverty between Informal Firms, Logit Estimates**

	(1) Coefficients Poor=1	(2) Marginal effects	(3) Coefficients Poor=1	(4) Marginal effects
Top-performers	Ref.		Ref.	
Constrained gazelles	0.320** (0.146)	0.0681** (0.0309)	0.409*** (0.154)	0.0715*** (0.0270)
Survivalists	0.736*** (0.132)	0.157*** (0.0277)	0.582*** (0.154)	0.102*** (0.0269)
Constant	0.276** (0.124)		1.339*** (0.193)	
Sector fixed effects			yes	
Region fixed effects			yes	
Pseudo-R2	0.0111		0.1517	
Observations	3,398	3,398	3,398	3,398

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \*p<0.1

A Lorenz curve illustrates inequality across the three distinct groups of informal firms (Figure 4.4). It shows that the profit – which constitutes entrepreneurs’ revenue – is more equally distributed across top performers than across the other two groups of informal firms. For instance, the poorest 25 percent of top performers share about 8 percent of the profits, whereas the poorest 25 percent of the constrained gazelles possess only 1.5 percent of the profits. The Gini coefficient is about 0.40 among top performers whereas this index is higher among constrained gazelles (0.57) and survivalists (0.60). Thus, income inequality varies across informal firms. The top-performing firms are not only wealthier, but also the income of the group is distributed more equally across the group.

**Figure 4.4. Lorenz Curves by Informal Firms**



An ordered logit regression that highlights the factors explaining income inequality for all the firms together (all sample) and for each of the three segments of firms separately is then performed, as follows:

$$Y_{ij}^* = \beta_{0j}Gross\_profit_{ij} + X'_{ij}\beta_1 + H'_{ij}\beta_2 + M'_{ij}\beta_3 + S'_{ij}\beta_4 + R'_{ij}\beta_5 + \varepsilon_{ij} \quad (4.5)$$

where  $Y_{ij}^*$  represents the ordered quintiles of income per adult equivalent for entrepreneur  $i$  in segment  $j$ . The segments refer to the three distinct groups of informal firms: top performers, constrained gazelles and survivalists.  $Gross\_profit_i$  is the gross operating surplus of firm  $i$ . It is defined as the value added minus mixed income, the compensation of employees and other taxes plus subsidies on production. Thus, if an increase in the gross operating surplus raises the income of the less well-off entrepreneurs, it means that inequality narrows. The vector  $X_i$  includes standard characteristics of the firm's owner, that is, age, age squared, gender and the age of the firm. The vector  $H_i$  includes educational attainment, financial knowledge, reading knowledge and a dummy taking the value 1 if the owner is a member of a business association. The vector  $M_i$  represents proxies for the firm's management skills. It includes lack of customers, credit access and equipment, management problems, firm location and employees' discipline issues. Finally, dummies for sector ( $S_i$ ) and region ( $R_i$ ) are included.

Table C6 (in appendix) displays the estimates of regression (4.5). The results show that for an increase of CGF 1,000 in the gross operating surplus, the odds of being in the top quintile versus the (combined) other categories are 1.001 times (or 10 percent) greater (all sample). This means that there is inequality among the informal entrepreneurs. An increase in profits is more likely to positively impact the income of the richest entrepreneurs than the others' incomes. When considering each category of firms, the constrained gazelles and survivalists show the same pattern. However, among the top performers there is an equal chance of being in the top quintile of income, even if the estimated coefficient is not significant.

Human capital, including educational attainment and the ability to read in any language is a key factor, that is, it increases the probability of being in the top quintile for all types of informal firms. Still, the impact of postsecondary educational attainment among top performers is the greatest. Attainment of other post-primary education, including vocational training, increases the odds of being in the top income quintile among constrained gazelles, though this is not the case for the two other groups. Moreover, firms with less access to credit are less likely to be in the top income

quintile. Because of a lack of credit access, top performers, constrained gazelles, and survivalists are less likely to be among the richest 20 percent. The impact of the lack of credit access on income inequality is greater among constrained gazelles and survivalists (see Table C6).

Firm size and the income of the owners appear to be independent among top performers and survivalists. However, among constrained gazelles, there is a significant negative relationship between firm size and the probability of being in the highest income quintile. Regarding the factors underlying firm organization, firms constrained by credit access are less likely to be in the top income quintile.

These results highlight that pro-poor policies aimed at improving education and providing access to finance are the most favorable to increasing income among the poorest among informal firms.

The results of inequality regressions are robust to two other classification methods of the three groups of informal firms and to two other definitions of top performers. First, the groups of top performers and constrained gazelles are reclassified based on the median value of capital (appendix, Table C7). This gives 690 top performers and 941 constrained gazelles. Second, the top performers are redefined as those entrepreneurs in the top 10 percent of the distribution of value added per hour worked (appendix, Table C8). The chapter also tests whether the classification changes according to the definition of a top performer. First, top performers are defined as those entrepreneurs in the sample who are in the top 40 percent in terms of capital productivity among the top 40 percent of the capital distribution. Second, the chapter defines top performers as those entrepreneurs in the sample who are in the top 40 percent in terms of capital productivity among the top 50 percent of the capital distribution. Then, the chapter classifies the two other groups, the constrained gazelles and survivalists. Tables C9 and C10 in the appendix present the results.<sup>44</sup>

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<sup>44</sup> An endogeneity test was performed to assess the potential endogeneity of our profit variable (gross operating surplus). Using the sector-region average of value added per hour worked as an instrument for gross operating profit, the test did not find evidence of endogeneity.

## 4.7. Drivers of the performance of informal firms

In the previous section, poverty and income inequality are analyzed among informal firms. The findings show that policies aimed at reducing the performance gap between top performers and the two other groups, namely, constrained gazelles and survivalists, may also help lift entrepreneurs in the latter two groups out of poverty and reduce income inequality.

### 4.7.1. Explaining differences in income using Blinder-Oaxaca decomposition

This section first corroborates these results based on a Blinder-Oaxaca decomposition and then examines the factors that make one informal firm more successful than another.

The Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) explains the gap in the means of an outcome variable—the logarithm of per adult equivalent revenue in this case—between two groups. This chapter compares top performers with constrained gazelles and top performers with survivalists. It uses the Blinder-Oaxaca to decompose income differences into a part that is due to differences between the two groups in endowments or characteristics (explained component), on the one hand, and group differences in returns to those endowments (unexplained component), on the other.

The formalization of income differences is as follows:

$$\ln Income_{Tt} - \ln Income_{it} = (X_{Tt} - X_{it})\beta_{Tt} + (\beta_{Tt} - \beta_{it})X_{it} \quad (4.6)$$
$$i \in \{Constrained\ gazelles, Survivalists\}$$

where  $\ln Income_{Tt}$  and  $\ln Income_{it}$  represent the mean of the logarithm of per adult equivalent income for respectively top performers and constrained gazelles or survivalists in time  $t$ .  $X$  is the vector of control characteristics for individuals. The first term is the explained component, and the second term represents the unexplained component as described above.

Table 4.9 and Table 4.10 display the results. We observe that differences in firms' performance explain more than half a percent of the revenue gap between top performers and constrained gazelles. Differences in other factors including the individual characteristics of entrepreneurs such as age and human capital, and other managerial characteristics such as management and employee discipline issues, explain more than 20 percent of the revenue gap even though the coefficient is not significant. Nonetheless more than 25 percent of the gap remains unexplained.

**Table 4.9. Blinder-Oaxaca Decomposition of Per Adult Equivalent Income, Top Performers versus Constrained Gazelles**

Per adult equivalent consumption, Log	Coefficients	Std. Err.	P>z
Differential			
Mean prediction (top-performers)	13.18	0.044	0.000
Mean prediction (gazelles)	13.05	0.019	0.000
Difference	0.12	0.048	0.009
Explained			
Value added per hour worked, Log	0.065	0 .017	0.000
Other factors	0.026	0 .018	0.154
Total	0.091	0.024	0.000
Unexplained	0.033	0 .046	0.468
Observations= 1,427			

*Source:* Calculations using 1-2-3 Survey data, 2012.

**Table 4.10. Blinder-Oaxaca Decomposition of Per Adult Equivalent Income, Top Performers versus Survivalists**

Per adult equivalent consumption, Log	Coefficients	Std. Err.	P>z
Differential			
Mean prediction (top-performers)	13.18	0.044	0.000
Mean prediction (survivalists)	12.89	0.014	0.000
Difference	0.29	0.046	0.000
Explained			
Value added per hour worked, Log	0.039	0.016	0.018
Other factors	0.117	0.026	0.000
Total	0.157	0.029	0.000
Unexplained	0.133	0.049	0.007
Observations= 1,889			

*Source:* Calculations using 1-2-3 Survey data, 2012.

Overall, the performance of firms is an important factor in explaining income differences between top performers and constrained gazelles while it explains less than 15 percent of income differences between top performers and survivalists. The results of the Blinder-Oaxaca decomposition are in line with the previous findings that well performing informal firms (the top performers) are less poor and exhibit less income inequality relative to constrained gazelles and survivalists.



#### 4.7.2. Drivers of informal firms' performance

In the next step, the drivers of the performance of firms are analyzed. The following regression explains the value added per hour worked by a number of characteristics of the entrepreneurs such as human capital including educational attainment, financial knowledge, a proxy for social networks and proxies for management skills. The equation<sup>45</sup> is as follows:

$$\ln vah_i = \alpha_0 + \alpha_1 \ln K_i + \alpha_2 \text{nocapital}_i + X_i' \alpha_3 + H_i' \alpha_4 + M_i' \alpha_5 + S_i' \alpha_6 + R_i' \alpha_7 + \varepsilon_i \quad (4.7)$$

where the explained variable  $\ln vah_i$  is the log of the ratio of value added with the total hours worked in firm  $i$ .  $\ln K_i$  stands for the log of physical capital. Given that in our sample some firms do not possess any capital, a dummy variable  $\text{nocapital}_i$  that equals 1 when the firm has no capital is also introduced. This allows us to avoid obtaining unbiased estimates of the returns to capital when some firms have zero observations of capital (Battese 1997; Grimm, Knorringa, and Lay 2012). The vector  $X_i$  includes standard characteristics of the firm's owner, (age squared, gender and the age of the firm). The vector  $H_i$  includes educational attainment, financial knowledge, reading knowledge and a dummy taking the value 1 if the owner is member of a business association. The vector  $M_i$  includes proxies for firm's management skills such as lack of customers, lack of credit access, management issues, employees' discipline problems, and problems of location and lack of equipment. The equation also includes sector dummies  $S_i$  and region fixed effects  $R_i$ .

Equation (4.7) explains the performance drivers of the three groups of firms. Figure C7 (appendix) shows that the higher a firm's value added per hour worked, the better the firm performs. The results are displayed in Table 4.11. The first column shows the results when we estimate equation (4.7) with only some basic characteristics of the firm's owner, including education. The second column includes the variables estimated by vectors  $X_i$  and  $H_i$ . And the third column displays the results if one estimates the equation with all the variables. Table 4.11. The first column shows the results when we estimate equation (4.7) with only some basic characteristics of the firm's owner, including education. The second column includes the variables estimated by vectors  $X_i$  and  $H_i$ . And the third column displays the results if one estimates the equation with all the variables.

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<sup>45</sup> The regressions on the drivers of firm performance rely on the Cobb-Douglas production function.

The estimated capital elasticity is about 0.115 (column 3). This elasticity is lower than the capital elasticity (0.150) found using the 1-2-3 survey for seven Sub-Saharan African countries in the paper of Grimm, Knorringa and Lay (2012). The results show that the older the firm's owner, the better is the firm's, but at a narrowing rate. Human capital, including secondary educational attainment, vocational training, and reading knowledge, is significantly and positively correlated with the performance of a firm. For instance, some other post-primary educational attainment, such as vocational training, raises the performance of firms by around 41 percent (column 1).

Membership in a business association is another important factor in the success of firms. The availability of a professional network seems to be a key advantage that can help entrepreneurs gain access to resources such as information and credit.<sup>46</sup>

However, there is no clear gender effect. The estimated coefficient is positive, but not significant. All the coefficients associated with the factors used as proxies for management skills have the expected signs except the variable for the lack of equipment, which may not be a great problem for those entrepreneurs providing services such as hairdressers or luggage carriers. In any case, building performance-enhancing skills is always central to enhancing productivity and reducing inequality and poverty among informal firms. Entrepreneurs in the informal sector, especially survivalists, need formal (secondary) education. Including constrained gazelles and top performers, they also require specific vocational training programs to upgrade their business skills.

Employees' discipline issues and the lack of customers are the most relevant challenges to the good performance of informal firms in the Democratic Republic of Congo. Several sectors exhibit high growth potential. Besides construction and other household service activities (including hairdressing), apparel, and mining and other primary activities in production and the retrieval of raw materials are the sectors in which entrepreneurs are most likely to increase their productivity. Moreover, the analysis shows that, relative to survivalists, more top performers and constrained gazelles operate in these sectors.

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<sup>46</sup> The lack of credit access is not significant (Table 4.11, column 3). Regressions include another financial variable – which is not subject to endogeneity. While we are concerned about the potential reverse causality between access to credit and performance of firms, this chapter does not discuss the literature analyzing the link between financial development and economic growth and bi-directional causality.

**Table 4.11. Drivers of Performance**

Dependent variable: Log of value added per hour worked	(1)	(2)	(3)
Capital, log	0.112*** (0.0187)	0.105*** (0.0169)	0.115*** (0.0162)
No capital	0.943* (0.486)	0.888* (0.511)	1.268*** (0.471)
Age owner	0.0585*** (0.0105)	0.0571*** (0.0103)	0.0579*** (0.00947)
Age squared owner	-0.000695*** (0.000114)	-0.000679*** (0.000117)	-0.000685*** (0.000109)
Male (=1)	0.0497 (0.0693)	0.0459 (0.0626)	0.0553 (0.0661)
No diploma	Ref.	Ref.	Ref.
Primary completed	0.0373 (0.124)	0.0336 (0.117)	0.00483 (0.123)
Some secondary	0.227** (0.116)	0.223** (0.110)	0.209* (0.121)
Post-secondary	0.222 (0.138)	0.211 (0.131)	0.180 (0.144)
Other post primary	0.344* (0.191)	0.325 (0.224)	0.261 (0.262)
Can read	0.331*** (0.0872)	0.320*** (0.0915)	0.300*** (0.0968)
Firm age	0.0361** (0.0183)	0.0354** (0.0179)	0.0428** (0.0186)
Financial Knowledge		0.147* (0.0783)	0.171** (0.0750)
Business association		0.140* (0.0809)	0.169* (0.0897)
Lack of customers			-0.134** (0.0603)
Lack of credit access			-0.0365 (0.0669)
Management problems			-0.109 (0.0690)
Location problem			-0.106 (0.0745)
Lack of equipment			0.169** (0.0739)
Discipline problem			-0.430*** (0.125)
Constant			5.544*** (0.232)
Sector fixed effects			yes
Region fixed effects			yes
R-squared			0.106
Observations			3,119

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

These results are robust to three other measures of firm performance, namely, value added per worker, labor productivity and real labor productivity.<sup>47</sup>

<sup>47</sup> Labor productivity is the ratio of production to the number of workers. Real labor productivity is the ratio of turnover to the number of workers.

The logarithm of total hours of labor is included in the regressions as an additional explanatory variable. We observe that the more are the hours worked in a firm, the better this firm performs (appendix, Table C11).

Additionally, simple simulations indicate that a number of characteristics, including human capital and managerial skills, could improve the performance of informal firms. The simulation relies on ordinary least squares (OLS) estimates to show how the performance of constrained gazelles and survivalists would improve if these firms shared the same environment with top performers. The findings reveal that the performance of constrained gazelles (value added per hour worked) would be enhanced by approximately 5 percent if the entrepreneurs in these firms had the same or similar educational attainment, financial knowledge, business networks, and managerial abilities as top performers (appendix, Figure C8). Similarly, given backgrounds and preparation resembling those of the top performers, the performance of survivalists would improve by 26 percent.

Simulations also indicate that human capital—especially vocational training (post-primary education)—is an important factor in the performance of firms (appendix, Figure C9). Policies aimed at enrolling all top performers and constrained gazelles in vocational training could enhance their performance by 33 percent. Among survivalists, these policies could improve performance by 34 percent. The impacts of secondary education and reading knowledge on the performance of firms are not as strong. For instance, if all survivalists had access to secondary education, their performance would increase by 10 percent.

Additional factors have important effects on the success of firms. Discipline problems have a relatively greater impact on the performance of survivalists, which thereby decreases by 41 percent, than of top performers and constrained gazelles (approximately 39 percent). Likewise, wider access to financial knowledge and business associations could improve the performance of firms, but the impact is slightly stronger among survivalists.

#### **4.7.3. Explaining differences in performance using Blinder-Oaxaca decomposition**

In addition to identifying the main determinants of firms' performance in the Congolese informal sector, this chapter also explains the gap in the means of firms' performance – the logarithm of value added per hour worked – between top-performers and constrained gazelles and between top-performers and survivalists. It uses the Blinder-Oaxaca to decompose firms' performance differences into a part that is due to differences between the two groups in endowments or

characteristics (explained component), on the one hand, and group differences in returns to those endowments (unexplained component), on the other.

The formalization of income differences is as follows:

$$\ln vah_{Tt} - \ln vah_{it} = (X_{Tt} - X_{it})\beta_{Tt} + (\beta_{Tt} - \beta_{it})X_{it} \quad (4.7)$$

$$i \in \{Constrained\ gazelle, Survivalists\}$$

where  $\ln Income_{Tt}$  and  $\ln Income_{it}$  represent the mean of the logarithm of value added per hour worked for respectively top performers and constrained gazelles or survivalists in time  $t$ .  $X$  is the vector of control characteristics for individuals. It comprises the main variables used to estimate the equation on the determinants of firms' performance in addition to two other variables: risk aversion and active reaction to demand shocks. In equation (4.7), the first term is the explained component (endowments), and the second term represents the unexplained component (returns to endowments).

The results are presented in Table 4.12 and Table 4.13. Differences in endowments explain only a small part of the performance gap between the top performers and the constrained gazelles. Differences in capital endowments explain only 3.3 percent of the performance gap between the two groups. Differences in returns on endowments explain 98 percent of the differences in performance between the top-performers and the constrained gazelles (Table 4.12).

Differences in endowments explain about 10 percent of the performance gap between the top-performers and the survivalists. Differences in capital endowments account for 10.4 percent of the gap while the returns on endowments account for 90 percent of the differences in performance between top-performers and the survivalists (Table 4.13).

**Table 4.12. Blinder-Oaxaca Decomposition of firms' performance, Top Performers versus Constrained gazelles**

Value added per hour worked, Log	Coefficients	Std. Err.	P>z
Differential			
Mean prediction (top-performers)	9.598	0.064	0.000
Mean prediction (gazelles)	8.202	0.043	0.000
Difference	1.395	0.077	0.000
Explained			
Capital, Log	0.046	0.013	0.001
Other factors	-0.021	-0.99	0.324
Total	0.025	0.024	0.307
Unexplained	1.370	0.078	0.000
Observations= 1,452			

*Source:* Calculations using 1-2-3 Survey data, 2012.

**Table 4.13. Blinder-Oaxaca Decomposition of firms' performance, Top Performers versus Survivalists**

Value added per hour worked, Log	Coefficients	Std. Err.	P>z
Differential			
Mean prediction (top-performers)	9.598	0.063	0.000
Mean prediction (survivalists)	7.784	0.037	0.000
Difference	1.814	0.073	0.000
Explained			
Capital, Log	0.189	0.036	0.000
Other factors	-0.009	0.050	0.853
Total	0.179	0.054	0.001
Unexplained	1.634	0.083	0.000
Observations= 1,933			

*Source:* Calculations using 1-2-3 Survey data, 2012.

## **4.8. Conclusion and Policy Recommendations**

The informal sector accounts for an important share of the economic activities in Sub-Saharan Africa. The literature on the informal sector has focused mainly on explaining the causes of the emergence and productivity of informal firms and on ways to formalize the informal sector. Using 1-2-3 survey data on the Democratic Republic of Congo, this chapter contributes to the empirical literature in four main areas. First, following Grimm, Knorringa, and Lay (2012), the chapter identifies a third category of informal firms in the country, constrained gazelles, who are neither top performers nor survivalists, and assesses the heterogeneity across these three classifications of firms. Constrained gazelles show substantial potential to become top performers but are constrained by their external environment (lack of water, electricity, telecommunication infrastructure, and finance). Second, the chapter examines poverty and income inequality within these three distinct categories of firms. Third, using a Blinder-Oaxaca decomposition, it explains income differences across the three groups. Fourth, the chapter analyzes the drivers of performance and profitability among informal firms.

The chapter underlines that poverty and income inequality are more prevalent among constrained gazelles and survivalists than among top performers. Income inequality among informal firms is explained primarily by disparities in educational attainment and infrastructure, including the lack of access to credit. Vocational training raises the odds of being in the top quintile among constrained gazelles. Access to finance, including financial knowledge and access to credit, is a more crucial factor among constrained gazelles and survivalists than among top performers.

The results also show that performance is a key factor in explaining income differences between informal firms. For example, differences in the performance of firms explain more than 50 percent of the income gap between top performers and constrained gazelles. Thus, policies aimed at reducing the performance gap between top performers and the two other categories of informal firms—constrained gazelles and survivalists—could narrow income inequality and reduce poverty.

The amount of capital, secondary educational attainment, vocational training, and professional networks are important determinants of the performance of firms. Thus, membership in a business association boosts the performance of firms by around 17 percent. Lack of demand and employee discipline issues are two important impediments to performance. The Congolese informal sector

is tremendously heterogeneous in human and physical capital. This heterogeneity means that the establishment of effective broad-based programs is difficult.

The informal sector is the critical lifeline of the Democratic Republic of Congo. It accounts for 81.5 percent of all employment in the country. Because of this importance, policies to reduce poverty in the country should be tailored to each of the three groups of firms in the informal sector. For the survivalists, the priorities should involve providing vocational training to improve technical and managerial skills and raise the sense of entrepreneurship. Improving financial literacy and easing the access to finance are also essential for this group. Unlocking the potential of the constrained gazelles would require facilitating the access to credit and supplying training programs to enhance managerial skills. The assistance for top performers should seek to strengthen managerial skills and improve the access to infrastructure, enabling these firms to expand markets.

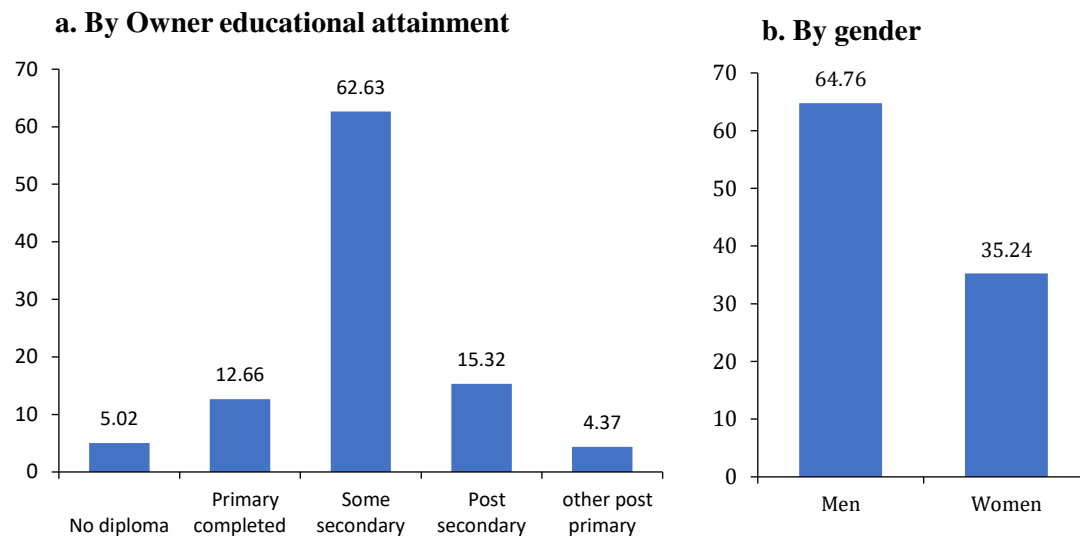


## Appendix C

**Table C1. Definition of the Variables**

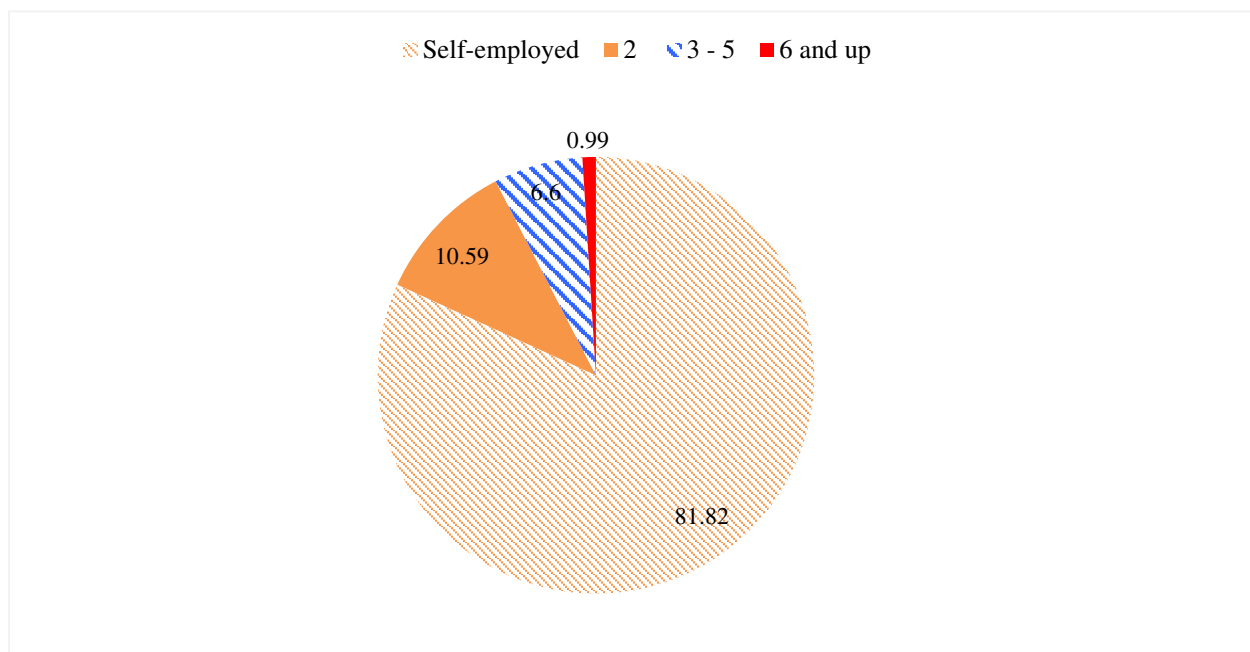
<i>Variable</i>	<i>Description</i>
<i>Owner characteristics</i>	
Age	Age of firm's owner, years
Male	Takes value of 1 if entrepreneur is a man
Can read in any language	"Yes" responded to the question, "Do you know how to read in any language?"
Can write in any language	"Yes" responded to the question, "Do you know how to write in any language?"
Education	Measured by highest diploma achieved in school system
No other opportunity in large firm	Entrepreneur created business because s/he could not find paid job in large firm
No other opportunity in small firm	Entrepreneur created business because s/he could not find paid job in small firm
By family tradition	Entrepreneur created business by family tradition
Trade register	Entrepreneur keeps a trade register on her/his activity
Business association	Entrepreneur is a member of business association relevant to her/his activity
Financial knowledge	Takes the value of 1 if entrepreneur knows some microfinance institutions
Income per adult equivalent	Per adult equivalent expenditure, adjusted for provincial price differences
Poor	Takes value of 1 if entrepreneur is poor and 0 otherwise
<i>Household characteristics</i>	
Size	Number of all household members
Wage earner is a woman	The wage earner in the household is a woman
Wage earner is a man	The wage earner in the household is a man
<i>Firm characteristics</i>	
Age	Age since firm was established
Set up with one person	Firm was established by one person
No capital	Firms operates without any physical capital
Capital	Replacement value of all business-related assets that have been used to operate the enterprise in the last year, including the business establishment, machines, furniture, Gross profit measured as sales turnover, excluding taxes, minus amount of tax-free costs of inputs (raw materials, merchandise), minus purchase amount, excluding
Gross operating surplus	Value added measured as turnover, minus the costs for intermediate inputs
Annual value added	Self-reported total number of hours worked in firm in last 12 months
Total annual hours	Number of hired staff who are paid
Hired paid workers	Number of nonpaid staff in firm
Nonpaid workers	Number of total workers in firm
Size	Firm is staffed by one person
Self-employment	Takes value of 1 if firm has poor access to credit
Lack of credit access	Takes value of 1 if firm encounters problems to sell (lack of customers)
Lack of customers	Takes value of 1 if firm encounters management problems
Management problem	Takes value of 1 if employee discipline issues in firm
Discipline problem	Takes value of 1 if difficulties in recruitment of qualified workforce
Lack of qualified workforce	Takes value of 1 if firm encounters lack of equipment issues
Lack of equipment	Takes value of 1 if lack of space in firm and/or unsuitable location
Location problem	Water connection available in firm
Water connection	Electricity connection available in firm
Electricity connection	Telephone connection available in firm
Telecommunication	No fixed location for activity
Street serves as location	No fixed location for activity
Mobile (improvised) street location	Entrepreneur operates her/his activity on street
Fixed street location	Firm located in a vehicle
Vehicle serves as location	Activity operated in customer's home
Customer's home serves as location	Firm located at home (with/without amenities)
Firm located at home	Fixed location in market
Fixed location in market	Improvised location in market
Improvised location in market	Firm is shop or restaurant
Shop, restaurant	Any other type of location not listed above
Other location	Take value of 1 if firm is in respective sector (exclusive); zero otherwise
Sector dummies	Take value 1 if firm is in respective region/province (exclusive); zero otherwise
Regional/Provincial dummies	

**Figure C1. Informal Businesses Started Because of Job Shortages in Large Firms**  
by Owner Educational Attainment and Gender, 2012 (%)



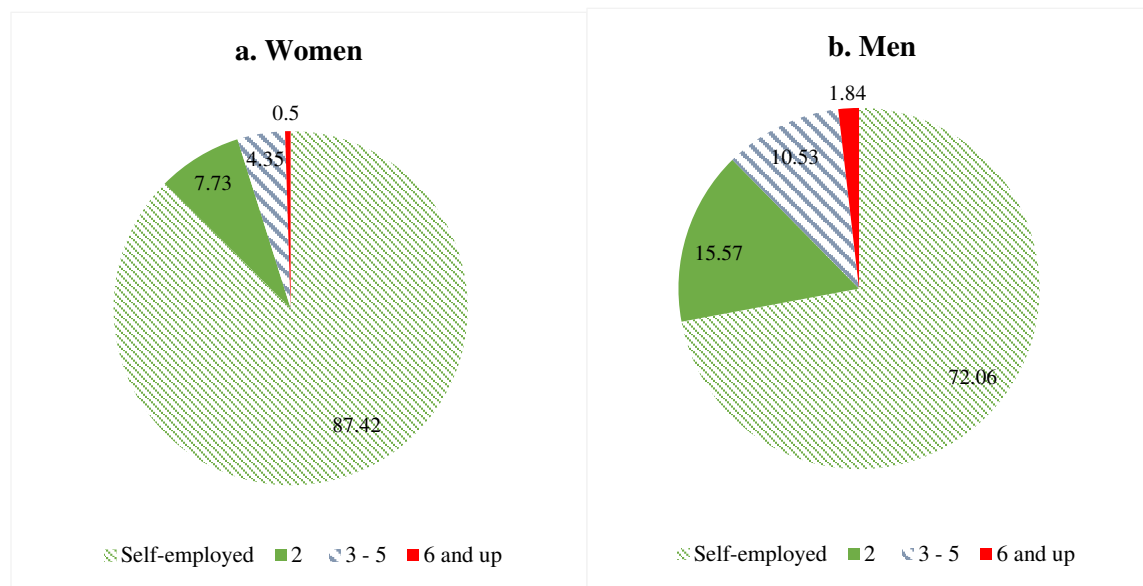
Source: Calculations using 1-2-3 Survey data

**Figure C2. Size of Informal Firms (%)**



Source: Calculations using 1-2-3 Survey data.

**Figure C3. Size of Informal Firms (%), by Gender**



Source: Calculations using 1-2-3 Survey data.

**Table C2. Descriptive Statistics, Capital Distribution, by Sector and Province**

	All	Bot. decile	1st q.	2nd q.	3rd q.	4th q.	Top decile
<b>Sectors</b>							
Food/Agribusiness	0.3840	0.1431	0.3646	0.2826	0.2259	0.1268	0.0556
Clothing and apparel	0.0839	0.0475	0.0955	0.1663	0.2775	0.4607	0.1158
Industry	0.1082	0.0478	0.1556	0.2627	0.3462	0.2355	0.0928
Construction	0.0154	0.0000	0.0570	0.3706	0.2665	0.3059	0.1793
Transport	0.0305	0.0641	0.0837	0.1155	0.1192	0.6816	0.4243
Hotels and restaurants	0.0269	0.0329	0.1083	0.0458	0.3068	0.5391	0.1372
Wholesale	0.0153	0.1730	0.2136	0.2352	0.1053	0.4458	0.1059
Primary and mining	0.0195	0.0558	0.1352	0.1209	0.1958	0.5481	0.2489
Retail shops and repair services	0.2601	0.1092	0.2733	0.2406	0.2854	0.2007	0.0649
Other activities	0.0562	0.1440	0.2153	0.2303	0.1248	0.4296	0.2602
<b>Regions/Provinces</b>							
Equateur	0.0753	0.0677	0.2009	0.2853	0.3553	0.1585	0.0332
Bandundu	0.1026	0.1751	0.3569	0.3245	0.1995	0.1192	0.0408
Bas-Congo	0.0488	0.1036	0.2136	0.2845	0.2001	0.3018	0.1550
Katanga	0.1129	0.0625	0.1579	0.2027	0.2296	0.4098	0.1999
Kasaï Oriental	0.1013	0.1331	0.3403	0.2358	0.1782	0.2456	0.0512
Kasaï Occidental	0.1080	0.1203	0.3514	0.2657	0.2284	0.1545	0.0325
Kinshasa	0.2347	0.0639	0.1936	0.2107	0.3089	0.2868	0.1325
Nord-Kivu	0.0427	0.2353	0.4230	0.2303	0.2282	0.1185	0.0094
Sud-Kivu	0.0489	0.2161	0.3539	0.3271	0.2024	0.1166	0.0649
Maniema	0.0221	0.0423	0.2734	0.1812	0.2453	0.3000	0.1535
Province Orientale	0.1027	0.0914	0.1750	0.1705	0.2827	0.3718	0.1644

Note: Means are weighted using sampling weights.

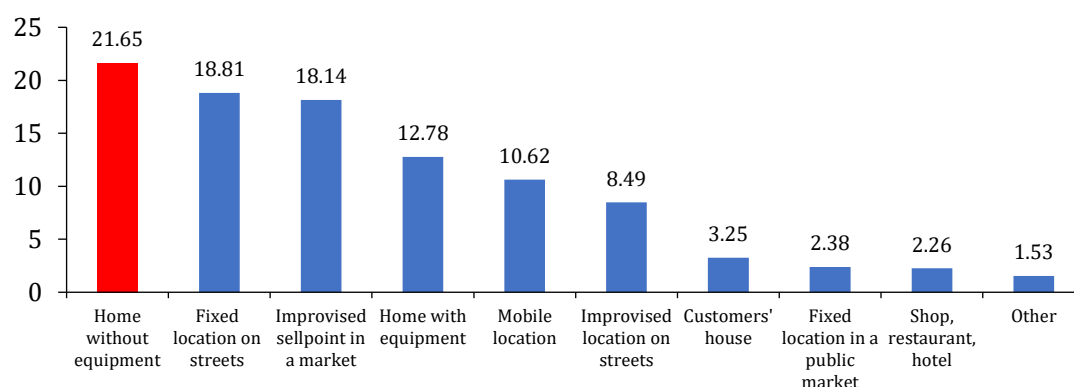
**Table C3. Descriptive Statistics, Capital Distribution, by Owner and Firm Characteristics**

	All	Bot. decile	1st q.	2nd q.	3rd q.	4th q.	Top decile
<b>Owner characteristics</b>							
Male	36.42	21.93	22.49	31.35	39.62	58.51	64.65
Age owner	37.8	38.44	37.71	38.26	37.33	37.23	38.18
No diploma	7.73	16.67	33.71	27.18	26.63	12.48	2.58
Primary completed	16.53	12.52	30.31	26.51	25.93	17.25	5.13
Some secondary	58.82	10.71	26.33	25.28	23.89	24.5	9.45
Post secondary	14.31	7.81	18.65	17.18	27.71	36.46	18.11
Other post primary	2.62	1.84	10.69	27.14	27.29	34.88	14.37
Can read	88.76	82.72	85.77	86.12	91.88	95.36	96.25
Can write	87.82	80.50	83.73	84.76	91.50	95.65	97.06
Poor	61.13	13.37	30.34	26.16	22.99	20.5	7.06
<b>Firm characteristics</b>							
Annual value added	4304138	981232.9	1275135	1438029	1901095	3226659	3782644
Physical capital	145255.6	1469.54	3215.51	11281.62	35296.27	532807.8	1137005
No capital	0.005	0.05	0.02	0.00	0.00	0.00	0.00
Value added per hour worked	20697.02	5340.53	6780.46	9360.12	9523.56	12800.06	14938.48
Gross operating profit	125703.4	59326.88	85340.87	108583.8	139324.8	184766.5	198145.5
Workers, total	1.30	1.11	1.13	1.2	1.4	1.74	2.13
Paid workers	0.14	0.041	0.035	0.06	0.16	0.41	0.77
Wage worker, male	0.23	0.202	0.204	0.24	0.19	0.23	0.32
Wage worker, female	0.13	0.16	0.12	0.13	0.1	0.14	0.22
<b>Infrastructure and locations</b>							
Water	8.45	3.95	10.19	14.70	25.1	50.01	31.38
Electricity	12.01	2.33	6.41	8.74	20.62	64.22	37.92
Land line, phone	15.34	3.44	9.00	15.74	27.25	48.02	24.58
Fixed location	57.97	10.11	24.12	22.54	25.45	27.89	10.9
Mobile location	40.51	11.37	28.42	27.36	23.73	20.49	8.47
Other location	1.52	8.69	21.44	10.58	42.16	25.82	13.35

Source: Authors' calculations using 1-2-3 survey data.

Note: Means and percentages are weighted using sampling weights. Percentages of characteristics of interest are presented in the upper panel. For the bottom panel, the first segment presents means of firms characteristics while the second shows percentages regarding endowments in infrastructure and locations of firms.

**Figure C4. Location of Activities, Informal Firms**

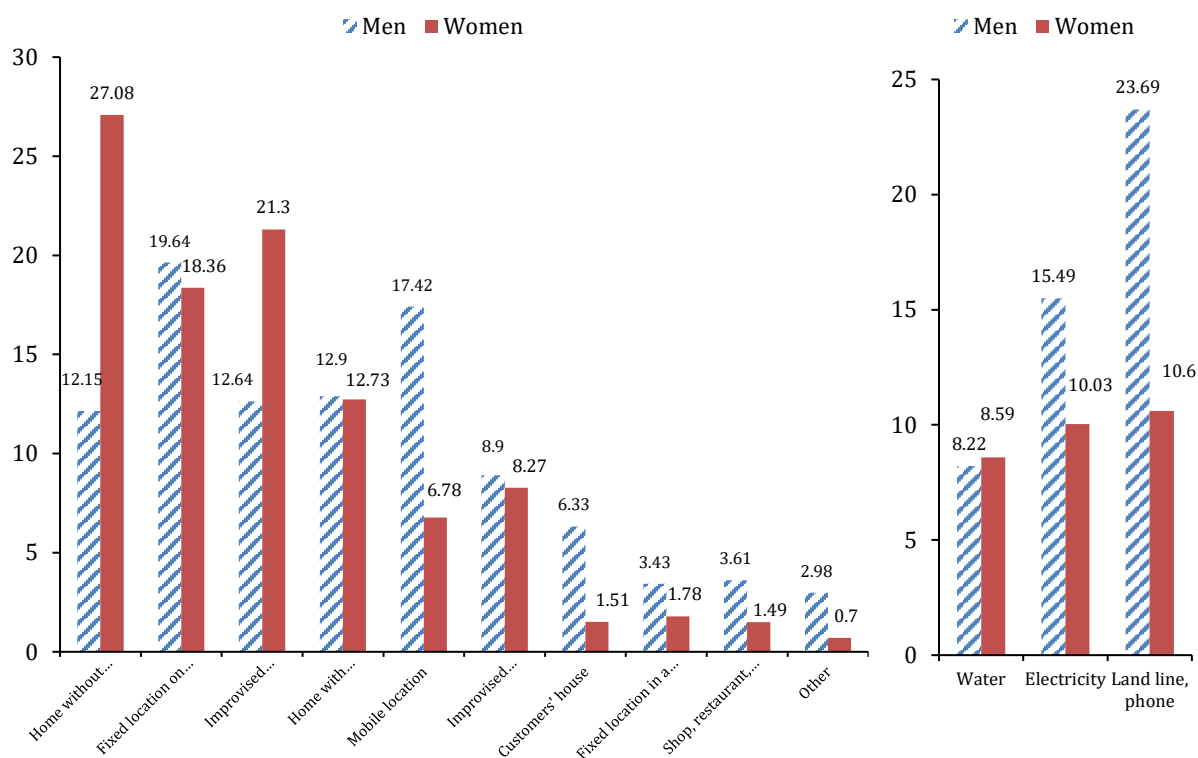


Source: Calculations using 1-2-3 Survey data

**Figure C5. Infrastructure and Business Activity, Location by Gender (%)**

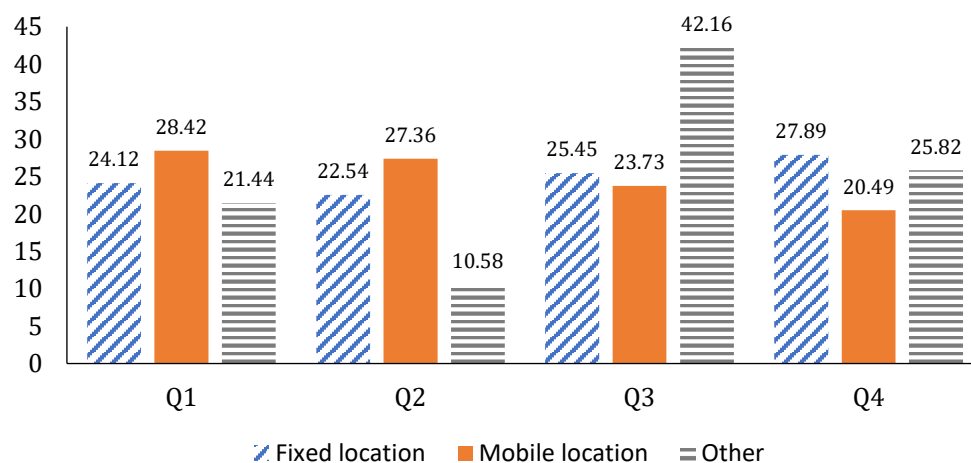
a. Types of Location

b. Water, electricity, phone



Source: Calculations using 1-2-3 Survey data.

**Figure C6. Firm Location, by Quartile of Capital**



Source: Calculations using 1-2-3 Survey data.

**Box C1. Probit model with selection bias – Heckman two-step procedure**

The chapter used the Heckman procedure to correct for sample bias. The first step consists in estimating the probit model (equation (1)), i.e., calculating the probability that a firm has capital and then obtaining the linear predictors from the model. The second step consists in calculating the inverse Mills ratio and including it in equation (1). The inverse Mills ratio is the ratio of the probability density function and the cumulative distribution function divided by the standard error of the probit estimation. This ratio is calculated as follows:

$$\widehat{MR} = \frac{\phi(X'_i \alpha_1 / \sigma_\omega)}{\Phi(X'_i \alpha_1 / \sigma_\omega)}$$

The probability density and cumulative distribution functions are

$$\text{such that: } \Pr(\text{Capital} = 1 | X) = \int_{-\infty}^{X \alpha_1} \phi(t) dt = \Phi(X \alpha_1).$$

**Table C4. Step 2: Probability of being a Top Performer, FILM**  
Full Information Maximum Likelihood Model Estimation

Dependent variable: Probability of being a top performer	Coefficients
Age owner	0.00595*** (0.0016)
Age squared owner	-0.000071*** (0.000)
Male(=1)	0.0606*** (0.0106)
Age firm	0.00226 (0.00315)
No diploma	Ref.
Primary completed	0.006 (0.02)
Some secondary	0.0281 (0.0180)
Post-secondary	0.0404* (0.0220)
Other post primary	0.0956*** (0.0354)
No opportunity in large firms	0.0591*** (0.0156)
Family tradition	0.0161 (0.0171)
Constant	-0.0821* (0.0373)
Log likelihood	-54212.128
LR test of model vs. Saturated	Prob > chi2 = 1
Observations	4,504
Model	FIML
OIM Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	
The test of model vs. Saturated chi2 indicates the model is a good fit.	

**Table C5. Probability of being Top Performers, Constrained Gazelles, or Survivalists, Logit Model**

	(1)	(2)	(3)	(4)	(5)	(6)
	Top-performers		Constrained Gazelles		Survivalists	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Age owner	0.123*** (0.0275)	0.00924	0.451*** (0.0368)	0.0494	-1.001*** (0.0806)	-0.0591
Age squared owner	-0.00151*** (0.000346)	-0.000113	-0.00547*** (0.000448)	-0.000598	0.0122*** (0.000968)	0.000722
Male(=1)	0.806*** (0.144)	0.0604	3.313*** (0.163)	0.362	-6.884*** (0.441)	-0.407
Age firm	0.0345 (0.0495)	0.00259	0.0961** (0.0383)	0.0105	-0.278*** (0.0491)	-0.0164
No diploma	Ref.		Ref.		Ref.	
Primary completed	0.168 (0.350)	0.00966	0.797*** (0.226)	0.0777	-1.427*** (0.417)	-0.0716
Some secondary	0.455 (0.342)	0.0295	1.676*** (0.237)	0.174	-3.668*** (0.437)	-0.201
Post-secondary	0.607* (0.366)	0.0419	2.424*** (0.290)	0.263	-4.977*** (0.505)	-0.288
Other post primary	1.090** (0.472)	0.0912	3.802*** (0.558)	0.433	-9.732*** (0.834)	-0.576
No opportunity in large firms	0.489*** (0.180)	0.0367	1.288*** (0.262)	0.141	-4.376*** (0.402)	-0.258
No opportunity in small firms	-0.276 (0.200)	-0.0207	-0.0842 (0.120)	-0.00922	0.707*** (0.156)	0.0418 (0.00969)
Sector fixed effects	yes		yes		yes	
Province fixed effects	yes		yes		yes	
Pseudo-R2	0.0792		0.4721		0.7199	
Observations	3,416	3,416	3,416	3,416	3,326	3,326



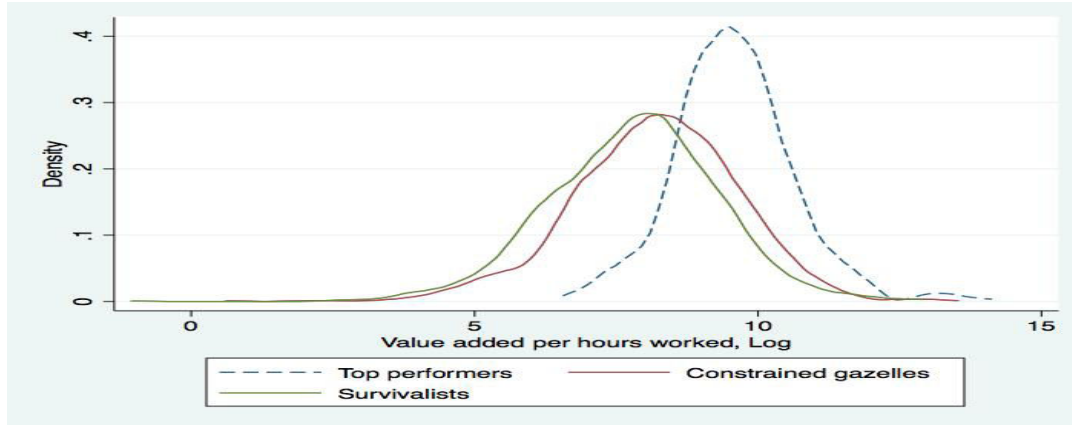
**Table C6. Income Inequality: Ordered Logit**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All sample		Top-performers		Constrained gazelles		Survivalists	
	Coefficients	Odds ratio	Coefficients	Odds ratio	Coefficients	Odds ratio	Coefficients	Odds ratio
Gross operating profit	0.00108*** (0.000188)	1.001	0.000489 (0.000374)	1.000	0.000980*** (0.000338)	1.001	0.00204*** (0.000450)	1.002
Age owner	-0.0276*** (0.0104)	0.973	0.0298 (0.0656)	1.030	-0.0260 (0.0353)	0.974	-0.0252* (0.0151)	0.975
Age squared owner	0.000344*** (0.000121)	1.000	-0.000445 (0.000788)	1.000	0.000215 (0.000438)	1.000	0.000338* (0.000172)	1.000
Male(=1)	-0.149** (0.0688)	0.862	-0.677** (0.326)	0.508	-0.0722 (0.151)	0.930	-0.355** (0.159)	0.701
No diploma	Ref.		Ref.		Ref.		Ref.	
Primary completed	0.0351 (0.125)	1.036	1.123 (0.687)	3.075	-0.0648 (0.356)	0.937	-0.0165 (0.167)	0.984
Some secondary	0.532*** (0.115)	1.702	1.142* (0.591)	3.133	0.427 (0.325)	1.532	0.429*** (0.159)	1.536
Post secondary	1.135*** (0.141)	3.111	2.098*** (0.667)	8.150	1.134*** (0.358)	3.110	0.902*** (0.219)	2.464
Other post primary	0.619*** (0.219)	1.856	1.313 (0.871)	3.718	0.687* (0.418)	1.988	0.876 (0.582)	2.400
Can read	0.447*** (0.0974)	1.563	0.0436 (0.665)	1.045	0.909*** (0.276)	2.482	0.404*** (0.129)	1.497
No opportunity in small firms	-0.000629 (0.0866)	0.999	0.795* (0.444)	2.215	-0.0311 (0.156)	0.969	-0.0724 (0.136)	0.930
Firm size	0.00340 (0.0561)	1.003	-0.0217 (0.174)	0.979	-0.205** (0.0871)	0.814	0.0680 (0.105)	1.070
Trade register	0.830*** (0.258)	2.294	0.397 (0.959)	1.487	1.469*** (0.374)	4.346	0.604 (0.600)	1.829
Financial knowledge	0.421*** (0.0822)	1.523	-0.326 (0.347)	0.722	0.404*** (0.141)	1.498	0.396*** (0.141)	1.486
Business association	-0.0507 (0.113)	0.951	0.359 (0.367)	1.431	-0.341* (0.182)	0.711	0.167 (0.208)	1.182
Lack of customers	0.0401 (0.0602)	1.041	0.174 (0.275)	1.191	0.160 (0.111)	1.174	-0.0109 (0.0942)	0.989
Lack of credit access	-0.193*** (0.0645)	0.825	-0.479* (0.270)	0.619	-0.237** (0.119)	0.789	-0.246** (0.101)	0.782
Management problems	0.0895 (0.0781)	1.094	-0.208 (0.363)	0.812	0.269* (0.145)	1.309	0.0827 (0.122)	1.086
Sector fixed effects	yes		yes		yes		yes	
Region fixed effects	yes		yes		yes		yes	
Pseudo-R2	0.0999		0.1789		0.1176		0.0902	
Observations	4,012	4,012	265	265	1,194	1,194	1,681	1,681

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Discipline problems, no opportunity in large firms, firms age and lack of qualified workforce are non significant additional control variables which are included in the regressions but not presented in this table

**Figure C7. Distribution of the Log of Value Added per Hours Worked**



**Table C7. Income Inequality, Reclassification (1)**

Reclassification of Firms Based on Median Value of Capital

	(1)	(2)	(3)	(4)
	Coefficients	Odds ratio	Coefficients	Odds ratio
Gross operating profit	0.000562* (0.000301)	1.001	0.00145*** (0.000383)	1.001
Age owner	-0.0236 (0.0498)	0.977	-0.0273 (0.0395)	0.973
Age squared owner	0.000140 (0.000595)	1.000	0.000227 (0.000499)	1.000
Male(=1)	-0.205 (0.225)	0.815	-0.196 (0.163)	0.822
No diploma	Ref.		Ref.	
Primary completed	1.011* (0.608)	2.750	-0.417 (0.372)	0.659
Some secondary	1.302*** (0.559)	3.675	0.0797 (0.332)	1.083
Post secondary	2.487*** (0.588)	12.03	0.410 (0.373)	1.506
Other post primary	1.010 (0.670)	2.745	0.573 (0.445)	1.773
Can read	0.867* (0.525)	2.380	0.882*** (0.292)	2.416
No opportunity in large firms	-0.0600 (0.204)	0.942	0.0939 (0.167)	1.098
No opportunity in small firms	-0.0182 (0.243)	0.982	0.0937 (0.184)	1.098
Firm size	-0.156 (0.106)	0.855	-0.0786 (0.121)	0.924
Firm age	-0.0528 (0.0528)	0.949	0.0811* (0.0444)	1.084
Trade register	1.056*** (0.410)	2.874	1.926*** (0.729)	6.864
Financial knowledge	0.103 (0.199)	1.109	0.281 (0.176)	1.324
Business association	-0.219 (0.248)	0.803	-0.263 (0.227)	0.769
Lack of customers	0.148 (0.159)	1.160	0.163 (0.134)	1.177
Lack of credit access	-0.434*** (0.174)	0.648	-0.197 (0.139)	0.821
Management problems	0.221 (0.229)	1.248	0.309* (0.165)	1.362
Lack of qualified workforce	0.782* (0.424)	2.186	-0.454 (0.596)	0.635
Discipline problem	0.109 (0.385)	1.115	0.208 (0.421)	1.231
Sector fixed effects	yes		yes	
Region fixed effects	yes		yes	
Pseudo-R2	0.1582		0.1026	
Observations	616	616	843	843

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table C8. Income Inequality, Reclassification (2)**

Top Performers Are Firms in the Top 10 Percent of the Distribution by Value Added per Hour Worked

	(1)	(2)	(3)	(4)	(5)	(6)
	Top-performers		Constrained gazelles		Survivalists	
	Coefficients	Odds ratio	Coefficients	Odds ratio	Coefficients	Odds ratio
Gross operating profit	0.000105 (0.000306)	1.000	0.00122*** (0.000355)	1.001	0.00200*** (0.000433)	1.002
Age owner	0.0147 (0.0357)	1.015	0.00162 (0.0195)	1.002	-0.0574*** (0.0150)	0.944
Age squared owner	-0.000218 (0.000411)	1.000	-0.000 (0.000242)	1.000	0.000652*** (0.000168)	1.001
Male(=1)	-0.0195 (0.207)	0.981	-0.0981 (0.0990)	0.907	-0.287** (0.115)	0.750
No diploma	Ref.		Ref.		Ref.	
Primary completed	-0.286 (0.456)	0.751	0.110 (0.237)	1.117	0.0420 (0.161)	1.043
Some secondary	0.305 (0.423)	1.356	0.753*** (0.220)	2.123	0.407*** (0.155)	1.502
Post secondary	1.324*** (0.491)	3.757	1.376*** (0.248)	3.959	0.805*** (0.215)	2.237
Other post primary	0.724 (0.621)	2.062	0.677** (0.315)	1.967	1.048* (0.578)	2.852
Can read	0.356 (0.357)	1.428	0.603*** (0.163)	1.828	0.283** (0.133)	1.327
No opportunity in large firms	0.115 (0.263)	1.122	0.194 (0.123)	1.214	0.0155 (0.235)	1.016
No opportunity in small firms	-0.362 (0.311)	0.696	0.189 (0.131)	1.208	-0.114 (0.128)	0.892
Firm size	0.127 (0.228)	1.135	-0.0429 (0.0788)	0.958	0.00233 (0.0918)	1.002
Firm age	-0.0290 (0.0561)	0.971	0.0181 (0.0280)	1.018	0.0152 (0.0356)	1.015
Trade register	0.405 (0.829)	1.499	1.056*** (0.324)	2.874	0.422 (0.538)	1.524
Financial knowledge	0.336 (0.224)	1.400	0.528*** (0.121)	1.696	0.359*** (0.136)	1.432
Business association	0.311 (0.352)	1.365	-0.169 (0.163)	0.844	0.116 (0.186)	1.123
Lack of customers	0.230 (0.186)	1.258	0.134 (0.0898)	1.143	-0.117 (0.0932)	0.890
Lack of credit access	-0.335* (0.202)	0.716	-0.111 (0.0948)	0.895	-0.226** (0.100)	0.798
Management problems	0.230 (0.241)	1.259	0.108 (0.116)	1.114	0.0204 (0.122)	1.021
Lack of qualified workforce	0.375 (0.899)	1.455	0.812** (0.373)	2.251	-0.488 (0.439)	0.614
Discipline problem	-0.262 (0.957)	0.769	-0.103 (0.290)	0.902	0.319 (0.376)	1.376
Sector fixed effects	yes		yes		yes	
Region fixed effects	yes		yes		yes	
Pseudo-R2	0.1255		0.1155		0.0918	
Observations	470	470	1,862	1,862	1,680	1,680

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table C9. Income Inequality, Reclassification (3)**

Top Performers Are Firms in the Top 40 Percent in Capital Productivity among the Top 40 Percent of the Capital Distribution

	(1)	(2)	(3)	(4)	(5)	(6)
	Top-performers		Constrained gazelles		Survivalists	
	Coefficients	Odds ratio	Coefficients	Odds ratio	Coefficients	Odds ratio
Gross operating profit	0.00112** (0.000504)	1.001	0.000899*** (0.000339)	1.001	0.00183*** (0.000384)	1.002
Age owner	0.0775 (0.0914)	1.081	-0.0465 (0.0369)	0.955	-0.0291** (0.0143)	0.971
Age squared owner	-0.000784 (0.00110)	0.999	0.000512 (0.000470)	1.001	0.000364** (0.000162)	1.000
Male(=1)	-0.974** (0.484)	0.377	-0.167 (0.145)	0.846	-0.394*** (0.128)	0.674
No diploma	Ref.		Ref.		Ref.	
Primary completed	1.011 (1.012)	2.749	0.277 (0.435)	1.319	-0.0498 (0.164)	0.951
Some secondary	0.835 (0.930)	2.306	0.947** (0.419)	2.579	0.300** (0.151)	1.350
Post secondary	2.143** (1.051)	8.529	1.663*** (0.451)	5.273	0.876*** (0.194)	2.400
Other post primary	2.089* (1.241)	8.073	0.946* (0.505)	2.575	0.861** (0.400)	2.366
Can read	-0.943 (0.887)	0.389	0.656** (0.286)	1.928	0.509*** (0.126)	1.664
No opportunity in small firms	1.104* (0.604)	3.017	-0.156 (0.156)	0.856	0.0233 (0.133)	1.024
Firm size	-0.00573 (0.228)	0.994	-0.0889 (0.0900)	0.915	-0.102 (0.0969)	0.903
Trade register	-	-	1.196*** (0.385)	3.306	1.207*** (0.464)	3.343
Financial knowledge	-0.369 (0.505)	0.691	0.341** (0.150)	1.406	0.397*** (0.129)	1.487
Business association	0.228 (0.470)	1.256	-0.248 (0.207)	0.780	0.00599 (0.176)	1.006
Lack of customers	-0.00695 (0.385)	0.993	0.141 (0.113)	1.151	-0.00625 (0.0906)	0.994
Lack of credit access	-0.342 (0.384)	0.710	-0.295** (0.122)	0.744	-0.217** (0.0955)	0.805
Management problems	0.106 (0.583)	1.111	0.292** (0.148)	1.338	0.0610 (0.116)	1.063
Sector fixed effects	yes		yes		yes	
Region fixed effects	yes		yes		yes	
Pseudo-R2	0.1813		0.1205		0.0970	
Observations	159	159	1,132	1,132	1,849	1,849

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Discipline problems, no opportunity in large firms, firms age and lack of qualified workforce are non significant additional control variables which are included in the regressions but not presented in this table. Trade register is dropped from the regression because of collinearity and limited observations.

**Table C10. Income Inequality, Reclassification (4)**

Top Performers Are Firms in the Top 50 Percent in Capital Productivity among the Top 50 Percent of the Capital Distribution

	(1)	(2)	(3)	(4)	(5)	(6)
	Top-performers		Constrained gazelles		Survivalists	
	Coefficients	Odds ratio	Coefficients	Odds ratio	Coefficients	Odds ratio
Gross operating profit	0.000691** (0.000326)	1.001	0.00122*** (0.000348)	1.001	0.00179*** (0.000557)	1.002
Age owner	0.0132 (0.0469)	1.013	-0.0419 (0.0328)	0.959	-0.0228 (0.0169)	0.977
Age squared owner	-0.000244 (0.000562)	1.000	0.000468 (0.000406)	1.000	0.000307 (0.000192)	1.000
Male(=1)	-0.244 (0.226)	0.784	-0.0225 (0.122)	0.978	-0.509*** (0.185)	0.601
No diploma	Ref.		Ref.		Ref.	
Primary completed	1.087** (0.483)	2.966	-0.0922 (0.318)	0.912	-0.0784 (0.178)	0.925
Some secondary	1.212*** (0.415)	3.362	0.348 (0.275)	1.416	0.419** (0.176)	1.520
Post secondary	1.751*** (0.478)	5.760	1.123*** (0.306)	3.075	0.819*** (0.250)	2.268
Other post primary	1.024 (0.626)	2.784	0.732** (0.373)	2.079	0.818 (0.938)	2.266
Can read	0.0655 (0.465)	1.068	1.016*** (0.225)	2.763	0.341** (0.140)	1.407
No opportunity in small firms	0.115 (0.301)	1.122	-0.0837 (0.142)	0.920	-0.0515 (0.159)	0.950
Firm size	0.205 (0.141)	1.228	-0.191** (0.0864)	0.826	-0.0611 (0.118)	0.941
Trade register	0.623 (0.806)	1.864	1.307*** (0.347)	3.694	0.705 (0.907)	2.024
Financial knowledge	0.172 (0.236)	1.187	0.372*** (0.133)	1.450	0.370** (0.170)	1.448
Business association	0.0330 (0.295)	1.034	-0.249 (0.181)	0.779	0.113 (0.231)	1.120
Lack of customers	0.190 (0.202)	1.210	0.155 (0.102)	1.168	-0.0528 (0.107)	0.949
Lack of credit access	-0.395** (0.200)	0.674	-0.199* (0.109)	0.820	-0.263** (0.116)	0.769
Management problems	0.361 (0.279)	1.435	0.163 (0.133)	1.177	0.0854 (0.136)	1.089
Sector fixed effects	yes		yes		yes	
Region fixed effects	yes		yes		yes	
Pseudo-R2	0.1277		0.1161		0.0903	
Observations	436	436	1,380	1,380	1,324	1,324

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

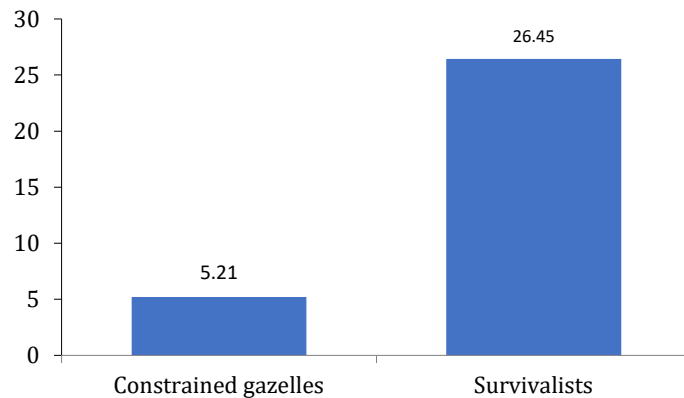
Note: Discipline problems, no opportunity in large firms, firms age and lack of qualified workforce are non significant additional control variables which are included in the regressions but not presented in this table.

**Table C11. Drivers of Performance, Robustness Check**

	(1) Coefficients Value added per worker, log	(2) Coefficients Labour productivity, log	(3) Coefficients Real labour productivity, log
Hours of labour, log	0.124*** (0.0303)	0.118*** (0.0246)	0.168*** (0.0289)
Capital, log	0.124*** (0.0165)	0.168*** (0.0152)	0.137*** (0.0150)
No capital	1.309*** (0.454)	1.632*** (0.456)	1.492*** (0.349)
Age owner	0.0616*** (0.00837)	0.0547*** (0.00816)	0.0598*** (0.00771)
Age squared owner	-0.000711*** 0.000093	-0.000646*** 0.000097	-0.000704*** 0.000088
Male(=1)	0.136** (0.0632)	-0.0498 (0.0506)	0.000514 (0.0480)
No diploma	Ref.	Ref.	Ref.
Primary completed	-0.0275 (0.112)	-0.0630 (0.110)	-0.0846 (0.104)
Some secondary	0.208** (0.0966)	0.199** (0.0990)	0.157* (0.0950)
Post-secondary	0.147 (0.125)	0.104 (0.119)	0.0837 (0.118)
Other post primary	0.260 (0.191)	0.192 (0.168)	0.223 (0.171)
Can read	0.356*** (0.0863)	0.378*** (0.0794)	0.370*** (0.0735)
Firm age	0.0378** (0.0193)	0.0342** (0.0158)	0.0133 (0.0152)
Financial Knowledge	0.251*** (0.0677)	0.199*** (0.0648)	0.238*** (0.0657)
Business association	0.312*** (0.0935)	0.348*** (0.0775)	0.429*** (0.0724)
Lack of customers	-0.140*** (0.0489)	-0.129*** (0.0437)	-0.114** (0.0487)
Lack of credit access	-0.0522 (0.0562)	-0.0452 (0.0456)	-0.0694 (0.0500)
Management problems	-0.115 (0.0758)	-0.0644 (0.0652)	-0.00239 (0.0598)
Location problem	-0.0109 (0.0590)	-0.0167 (0.0558)	0.0314 (0.0597)
Lack of equipment	-0.00921 (0.0745)	0.00400 (0.0670)	-0.132** (0.0558)
Discipline problem	-0.478*** (0.143)	-0.539*** (0.124)	-0.696*** (0.121)
Constant	9.693*** (0.262)	9.832*** (0.233)	10.75*** (0.236)
Sector fixed effects	yes	yes	yes
Region fixed effects	yes	yes	yes
R-squared	0.172	0.193	0.225
Observations	3,119	3,123	3,124

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure C8. Changes in firms' performance of constrained gazelles and survivalists if they have the same characteristics as top performers (%)**



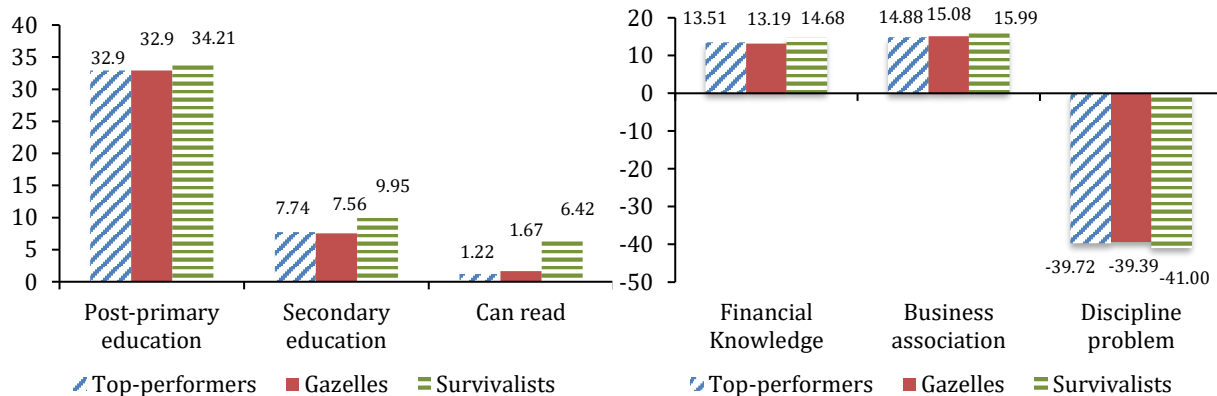
Source: Calculations based OLS estimates from performance

drivers regression (3) (column 3, Table 4.11).

**Figure C9. Changes in firms' performance (%)**

a. Educational attainment

b. Expertise, networking, employee discipline



Source: a: Calculations based on OLS estimates from performance drivers regression (1) (column 1, Table 4.11).

b: Calculations based OLS estimates from performance drivers regression (3) (column 3, Table 4.11).





# General Conclusion

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This dissertation highlights the critical role of sound institutions in achieving pro-poor and inclusive growth. It also underlines the importance of social and infrastructure spending as well as human capital and access to credit in addressing inequalities within countries and between firms in the informal sector.

The dissertation first examines the role of institutions in promoting pro-poor and inclusive growth at the macro-economic level. The findings show that growth has been pro-poor – that is, it has reduced poverty. However, growth has been not inclusive, as it did not significantly impact the growth of the income share held by the poorest 20 percent. All features of good governance are pro-poor but only government effectiveness and rule of law promote inclusive growth. While the impact of growth on the income of the poor is nonlinear and increases with the control of corruption, the relationship between government effectiveness and inclusive growth is linear. Education spending, infrastructure improvement, and financial development are key factors for promoting poverty reduction and inclusive growth.

Second, this dissertation investigates the role of fiscal policy in addressing rising inequalities. Fiscal policy is one of the most potent tools at the disposal of government to tackle income inequality. Using a newly assembled data on disaggregated public spending for 83 countries, the dissertation shows that progressive taxation and spending reallocations toward social protection and infrastructure are associated with reduced income inequality, particularly when they are financed through cuts in defense spending in countries with relatively strong institutions and at low risk of conflict. The dissertation also finds that reallocating social protection and infrastructure spending towards other type of spending tend to increase income inequality. Education and health spending also contribute to lower income inequality in the long-term.

Finally, the dissertation studies the role of structural policies in promoting shared prosperity in a context of pervasive informal sector. The last chapter focuses on the informal sector, which represents 80 percent of employment in the Democratic Republic of Congo. It provides evidence that this sector offers opportunities to the most vulnerable. It empirically identifies three groups of informal firms – the top-performers, the middle performers, and the lowest performers, and derives tailored policies to reduce poverty and inequality across these three distinct groups in the Democratic Republic of Congo. For the middle and lowest performers, policies could focus on implementing vocational training programs, improving infrastructure,

and easing access to finance. For the top-performers, policies could further strengthen their managerial skills.

The important and overarching findings from my research are that the goals of achieving high and sustained growth, reducing poverty and inequality do not have to be substitutes, they can complement and reinforce each other. This is critical as it highlights the crucial importance of creating synergies in designing solutions when resources are limited.



# Résumé général

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## Introduction

L'extrême pauvreté a considérablement baissé depuis 1990. Le taux de pauvreté extrême a été réduit de plus de moitié – de 35 pourcent en 1990 à 10,7 pourcent en 2013, principalement grâce à la forte croissance économique. Cette réduction reflète la transformation économique exceptionnelle dans la région Asie de l'Est et Pacifique, en particulier en Chine et dans d'autres pays émergents. Le taux de pauvreté extrême a diminué de 61,4 pourcent dans les années 1990 à moins de 4 pourcent en 2013. En Asie du Sud, la réduction de la pauvreté extrême est plus faible. Malgré les progrès en matière de réduction de pauvreté, le nombre de personnes vivant dans l'extrême pauvreté reste très élevé. Selon les estimations de la banque mondiale, 768,5 millions de personnes vivaient avec moins de 1,90 \$ par jour en 2013. Plus de la moitié des personnes vivant dans l'extrême pauvreté résident en Afrique Sub-Saharienne.

En dépit de récents progrès, la pauvreté reste répandue dans de nombreux pays en développement. Parallèlement, l'inégalité de revenu a augmenté dans plusieurs régions du monde pendant les récentes décennies. La croissance a été pro-pauvre et elle a permis une réduction de la pauvreté. Cependant, la croissance n'a pas été inclusive puisque les plus pauvres de la société ne contribuent et ne bénéficient pas de la croissance économique autant que les plus riches. A contrario, les plus riches tendent à détenir la plus grande partie des fruits de la croissance.

La littérature empirique identifie plusieurs déterminants de la réduction de la pauvreté et de l'inégalité de revenu. Ces facteurs incluent : la croissance économique, les institutions, le progrès technologique, le capital humain, et le commerce international (Dollar et Kraay, 2002; Dollar, Kleineberg et Kraay, 2013; Kaufmann et Aart, 2002; Resnick et Regina, 2006; Woo et al., 2017). Néanmoins, il existe peu d'évidence sur les politiques qui permettent d'atteindre la croissance inclusive.

Réduire la pauvreté et atteindre la croissance inclusive a été un objectif de longue date des gouvernements ainsi que de l'ensemble des partenaires de développement. Ces enjeux ont été et restent au cœur du débat des politiques de développement à travers le monde. Cette thèse fournit des leçons de politiques économiques sur le rôle des politiques institutionnelles, fiscales et structurelles dans la promotion de la croissance pro-pauvre et inclusive. Cette thèse contribue à la littérature et ces contributions se résument en trois principaux points. Premièrement, la

thèse examine les possibles relations non-linéaires entre la bonne gouvernance, la croissance pro-pauvre et inclusive. Deuxièmement, la plupart des études portent sur les effets des dépenses publiques sur la croissance, la pauvreté et l'inégalité mais ne considèrent pas les contraintes financières continues auxquelles la plupart des gouvernements font face. Cette thèse fournit une analyse sur données de panel étudiant comment un gouvernement peut diminuer l'inégalité de revenu en changeant la composition des dépenses publiques tout en gardant le montant total inchangé. Troisièmement, cette thèse étudie le rôle des politiques structurelles dans la réalisation des objectifs de prospérité partagée dans un pays fragile d'Afrique Sub-Saharienne où le secteur informel est très important – la République Démocratique du Congo.

Le reste de ce résumé général de la thèse est partagé en deux sections. La section 2 présente les principaux problèmes de données et quelques faits stylisés sur l'inégalité et la pauvreté. La section 3 présente les principales méthodologies économétriques et résultats de cette thèse.

## **Problèmes de données et faits stylisés**

### ***Inégalité***

Les études sur l'inégalité doivent au préalable bien définir le type d'inégalité dont il s'agit. L'inégalité comporte en effet de nombreuses dimensions : inégalité des résultats - par exemple, inégalité des revenus individuels, inégalité des revenus familiaux, inégalité de richesse, inégalité des dépenses de consommation ou du bien-être économique individuel ; et l'inégalité des chances ou d'opportunités. Comme la plupart des études, cette thèse se concentre sur l'inégalité des revenus ou de la consommation à l'intérieur des pays, ce qui reste le niveau auquel la plupart des politiques opèrent. Outre l'inégalité des revenus à l'intérieur des pays, il existe une inégalité entre les pays et une inégalité globale.<sup>48</sup> Cette dernière représente une combinaison des deux autres types d'inégalité évoqués précédemment.

Mesurer l'inégalité n'est ni facile ni simple (Banque mondiale, 2016). Les comparaisons entre pays peuvent être difficiles, en particulier lorsqu'il s'agit d'étudier les inégalités de revenu dans les pays. Premièrement, les enquêtes sur les ménages qui constituent la principale source de mesures de l'inégalité, couvrent soit la consommation, soit les dépenses. Les bureaux nationaux de statistique des pays industrialisés et d'Amérique latine ont tendance à compiler des statistiques sur les revenus des ménages, tandis que les bureaux nationaux de statistique

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<sup>48</sup> Cette thèse ne s'étend pas sur l'inégalité globale. Voir Bourguignon (2015) pour plus de détails.

d'Asie du Sud, d'Afrique subsaharienne et du Moyen-Orient collectent des données sur les dépenses de consommation. La Banque mondiale (2016) souligne que les données sous-estiment le niveau d'inégalité dans les pays où les données de consommation sont utilisées. Deuxièmement, les données provenant des enquêtes auprès des ménages risquent de sous-estimer les revenus (ou la consommation) à l'extrémité supérieure de la distribution. Les autres problèmes de mesure de l'inégalité comprennent la disponibilité des données et la comparabilité des enquêtes, les différences significatives dans les unités d'échantillonnage utilisées ainsi que la définition du revenu (net ou brut) ou la couverture temporelle des données sur les dépenses et les revenus.

Les sous-sections suivantes présentent des faits stylisés sur les différentes dimensions de l'inégalité et de la pauvreté dans le monde.

### ***Inégalité à l'intérieur des pays***

Le coefficient de Gini est la mesure de l'inégalité dans le pays la plus largement utilisée. Il est dérivé de la courbe de Lorenz, qui représente la part cumulée de la population par rapport à la proportion cumulée des revenus (ou des dépenses). Le coefficient de Gini considère la totalité de la distribution plutôt que les extrêmes. Outre le coefficient de Gini de la Banque mondiale, il existe un certain nombre de coefficients de Gini provenant de différentes sources. Premièrement, l'indice de Gini provenant de l'Etude sur le Revenu du Luxembourg (Luxembourg Income Study – LIS) est basé uniquement sur les enquêtes sur le revenu et vise à atteindre le plus haut niveau d'harmonisation. De plus, il n'inclut pas les données imputées. Cependant, la base de données LIS couvre relativement moins de pays et d'années. Elle couvre principalement des pays à revenus élevés et moyens. Les coefficients de Gini du revenu après impôts et transferts ou post-fiscaux (net) et pré-fiscaux (marché) provenant de la base de données normalisée sur l'inégalité des revenus mondiaux (Standardized World Income Inequality Database – SWIID) ont été construits par Frederik Solt en utilisant les données du LIS comme référence. Les coefficients de Gini provenant de SWIID ont l'avantage de (i) maximiser la comparabilité des données sur l'inégalité des revenus et (ii) maintenir une large couverture en termes de pays et d'années. Cependant, ces coefficients de Gini sont calculés en partie avec des valeurs générées en utilisant l'imputation basée sur un modèle pour les observations manquantes.

Bien que le coefficient de Gini soit trop sensible aux changements au milieu de la distribution, il est moins sensible aux changements en haut et en bas de la distribution des revenus. La base

de données PovCalnet de la Banque mondiale fournit des informations détaillées sur la répartition des revenus. Il indique le revenu moyen et les parts de revenu par décile et par quintile provenant d'enquêtes nationales auprès des ménages. Ces données ont l'avantage de capter la distribution des revenus aux extrémités.

La Figure 1.1 montre l'évolution de l'inégalité des revenus et des parts des revenus des 10 pourcent les plus riches et les 10 pourcent les plus pauvres dans le monde par niveau de revenu (pays avancés ; et pays émergents et à revenu faible). Les données suggèrent que depuis les années 1980, l'inégalité des revenus mesurée par le coefficient de Gini de la Banque mondiale a augmenté dans la plupart des pays avancés et dans de nombreux pays émergents et à faible revenu (Figure 1.1a). Les données sur l'indice de Gini du LIS couvrent principalement les économies avancées et montrent la même tendance (Figure 1.1b). L'inégalité des revenus disponibles (après impôt et après transfert) affiche une tendance similaire à la hausse (Figure 1.1c). Cependant, il existe une plus grande disparité entre les pays, principalement en raison des différents degrés de progressivité dans les systèmes fiscaux (de revenu) et des politiques de dépenses (Woo et al., 2017, Bastagli et al., 2012, entre autres). L'inégalité des revenus bruts (avant taxes et transferts) montre une tendance à la hausse pour la plupart des économies avancées, mais l'évolution dans les estimations de Gini de marché pour de nombreux pays en développement est très différente (Figure 1.1d).

Les données suggèrent que la part des revenus du décile supérieur dans la plupart des économies avancées a augmenté entre 1985-1995 et 2000-2010, à l'exception de la Slovaquie. En revanche, la part des 10 pourcent les plus pauvres a diminué dans la plupart des économies avancées (Figure 1.1e et Figure 1.1f). Dans les pays en développement, les variations de la part des revenus des déciles supérieur et inférieur varient d'un pays à l'autre.

### ***Inégalité entre pays***

Une transformation économique remarquable dans certaines régions du monde, en particulier en Asie de l'Est, a conduit à la convergence économique. Cependant, depuis les années 1960, la convergence avec les États-Unis s'est en moyenne inversée dans la région d'Afrique Subsaharienne, malgré des progrès substantiels dans plusieurs pays, en particulier durant ce siècle (Figure 1.2). Le Rwanda et l'Éthiopie ont par exemple réalisé de grands progrès et ont amélioré leurs revenus moyens depuis 2000. En moyenne, ils ont fait mieux que l'Asie du Sud. Pour le reste de l'Afrique Sub-Saharienne, l'écart avec l'Asie du Sud et l'Asie de l'Est s'est toutefois considérablement creusé.

La mesure de la richesse des nations, qui peut être capturée par le produit intérieur brut (PIB), importe aussi bien aux économistes qu'aux décideurs politiques. Le PIB est calculé par différentes institutions, y compris la Banque mondiale et le Programme de Comparaison Internationale (PCI), et est sujet à diverses questions. Le PCI compile les valeurs détaillées des dépenses du PIB pour les pays du monde entier. Le PCI vise également à estimer le taux de change des parités de pouvoir d'achat (PPA) des pays. L'incertitude de la mesure du taux de change du pouvoir d'achat est liée au fait que *« les prix relatifs sont beaucoup plus dissemblables entre le Tadjikistan et les États-Unis, ou la Chine ou l'Inde et les États-Unis qu'entre le Canada et les États-Unis »* (Deaton 2012). Cela soulève des questions concernant les différences de PIB par habitant en PPA entre trois bases de données de référence : le PCI, les indicateurs de développement dans le monde (World Development Indicators – WDI) et Penn World Table (PWT).

Après la publication du cycle 2011 du PCI par la Banque mondiale (2014, 2015) et de la version 9 du PWT qui intègre les estimations des PPA provenant du cycle 2011 du PCI, cette thèse calcule les différences entre les estimations du PIB par habitant en PPA entre les trois bases de données : cycle 2011 du Programme de Comparaison International (PCI), Indicateurs de développement dans le monde (WDI) – version 2016; et Penn World Table (PWT) version 9. Cette section essaie de comprendre les sources de ces différences.

Bien que d'impressionnants progrès aient été réalisés, de 2005 à 2011, dans le calcul des taux de change précis exprimés en PPA, cette thèse montre que l'harmonisation entre les trois principales sources de données pour l'année de référence 2011 n'a pas si bien progressé par rapport à la comparaison précédente (Ram et Ural 2013) pour l'année de référence 2005 en utilisant le cycle 2005 du PCI, WDI et PWT. Cependant, les pays qui présentent des estimations très différentes selon le PCI, le WDI et le PWT diffèrent entre l'année de référence 2011 (cette thèse) et l'année de référence 2005 (Ram et Ural 2013).

Le Table 1.1 montre qu'entre 9% et 15% des pays ont des différences absolues de plus de 10% entre les estimations de deux bases de données, en pourcentage des estimations PWT. Entre 24% et 40% des pays présentent des différences absolues de plus de 5% entre les estimations de deux bases de données. L'Ouzbékistan (UZB, 38%) et les Comores (COM, 57% et 52%) enregistrent des différences relatives maximales dans les estimations du PIB par habitant en PPA entre les trois bases de données.

Bien que PWT 9.0 et WDI 2016 utilisent comme données clés les informations sur les prix provenant du cycle 2011 du PCI, leurs estimations du PIB diffèrent nettement de celles du PCI



pour plusieurs pays tels que le Mali. Certains pays, tels que l'Iraq, ont des mesures très différentes pour chacune des trois bases de données. Inversement, certains pays ont très peu de différences dans le PIB par habitant en PPA entre les bases de données PCI et PWT. Ce qui n'est pas le cas entre le PCI et le WDI. Les pays touchés par des conflits, les pays africains, les îles et les exportateurs de pétrole sont surreprésentés dans la liste des pays présentant des différences entre les trois sources. En moyenne, les différences entre les estimations du PIB par habitant en PPA entre WDI et PWT sont plus faibles que les différences entre PCI et PWT, et celles entre WDI et PCI.

Étant donné que le PIB par habitant réel (en PPA) est l'une des mesures les plus utilisées du niveau de vie d'un pays, la compréhension des différences entre ces trois sources est une question importante pour les chercheurs et les décideurs politiques. Par exemple, Ciccone et Jarociński (2010) et Johnson et al. (2013) ont souligné que la variabilité des versions de PWT avait un impact sur les résultats des études de croissance.

L'une des causes des différences des estimations du PIB par habitant en PPA entre les trois bases de données pourrait être la faible capacité statistique de ces pays à collecter des données (Devarajan 2013). Cependant, cette thèse trouve des coefficients de corrélation plutôt faibles, inférieurs à 0,1 en valeur absolue et non significatifs. Ces différences ne sont donc pas nécessairement liées à la faible capacité statistique des sources de données originales (Table 1.5).

Les Figure 1.4, Figure 1.5 et Figure 1.6 présentent des corrélations entre les différences absolues de PIB par habitant en PPA entre WDI, PCI et PWT (par rapport à PWT) et l'indicateur de capacité statistique. Ces graphiques présentent les pays pour lesquels les différences en pourcentage en valeur absolue sont inférieures à 20%. Les corrélations ne sont pas significatives. Par ailleurs, on observe que certains pays (Ukraine, Arménie) ayant des niveaux plus élevés d'indicateur de capacité statistique ont des erreurs de mesure plus importantes dans le PIB par habitant en PPA entre les bases WDI et PWT et entre PCI et PWT (par rapport à PWT) mais une différence faible entre les bases WDI et PCI (0,1 % pour l'Ukraine et 1 % pour l'Arménie).

Les différences majeures entre les estimations du PIB par habitant en PPA peuvent être dues à des différences dans les estimations du PIB nominal et/ou dans les estimations de la parité de pouvoir d'achat (PPA), car différentes agences utilisent diverses sources de données et différentes méthodologies. Par exemple, alors que la Banque mondiale estime le PIB en collectant des données à partir des comptes nationaux, des instituts nationaux de statistiques et

des fichiers de données des comptes nationaux de l'OCDE (Organisation de Coopération et de Développement Economiques), le PWT s'appuie principalement sur les données du PIB aux prix courants et constants, en unités monétaires locales à partir des comptes nationaux. La principale source de ces données est la base de données des principaux agrégats des Nations Unies. Différents pays s'appuient sur des définitions, des méthodes et des normes de déclaration différentes pour estimer le PIB. En outre, les différences entre les trois bases de données concernant le PIB en monnaie locale peuvent résulter des révisions des comptes nationaux. Le Table 1.6 présente les différences absolues des estimations du PIB nominal entre les trois bases de données, respectivement en pourcentage de PWT et de PCI. Pour 3% (différence entre PCI et PWT) à 75% (différence entre WDI et PWT) des pays, les différences en pourcentage sont supérieures à 50%.

Une autre cause des différences significatives du PIB par habitant en PPA entre WDI version 2016, PWT 9.0 et ICP round 2011 pourrait être l'utilisation de différentes méthodes d'agrégation pour calculer le pouvoir d'achat de parité (PPA). Selon Feenstra, Inklaar et Timmer (2015), les pays à faible revenu ayant de plus faibles prix relatifs des biens non échangés sembleront plus pauvres si leurs dépenses sont simplement converties au taux de change nominal. Par exemple, le PIB nominal par habitant du Cambodge est de 1,9% celui des États-Unis, tandis que son PIB réel par habitant est de 5,9% celui des États-Unis en 2011. Pour obtenir une estimation du PIB en PPA, les agences statistiques de PWT utilisent une fonction de dépense estimée économétriquement tandis que les agences statistiques du PCI préfèrent les méthodes d'indexation<sup>49</sup>.

Le Table 1.7 récapitule les différences absolues dans les estimations de PPA entre PCI et PWT respectivement en pourcentage de PWT et de PCI pour l'année 2011. 22% des pays ont une différence en valeur absolue d'au moins 10% tandis que trois à quatre pour cent des pays ont plus de 50% de différences en termes relatifs (c'est-à-dire en pourcentage) dans les estimations de PPA entre PCI et PWT. Les pays enregistrant les plus fortes différences en pourcentage sont la Zambie, les îles Caïmans et le Kirghizistan.

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<sup>49</sup> Pour plus de détails sur les méthodes utilisées pour calculer les PPA par PWT, voir: Feenstra, Inklaar et Timmer (2015), pour les méthodes utilisées par le PCI, voir: [http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/01\\_ICPBook\\_Framework\\_NEW.pdf](http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/01_ICPBook_Framework_NEW.pdf)

Les différences dans les estimations de PIB par habitant en PPA peuvent également être dues à des disparités entre les bases de données dans les estimations de population. Devarajan (2013) indique que dans de nombreux pays, les comptes du PIB utilisent d'anciennes méthodes, de plus les recensements de la population sont obsolètes.

Les différences de PIB par habitant en PPA étant importantes entre les trois sources, en particulier pour certains pays, les conclusions de certaines recherches peuvent varier en fonction des estimations et de l'échantillon de pays utilisés. Le Table 1.8 présente des corrélations simples de l'indice de contrôle de la corruption de la Banque mondiale avec le PIB par habitant en PPA pour les bases PWT 9.0, le cycle 2011 du PCI et la version 2016 de WDI. Les différences de corrélation sont plus marquées pour les pays enregistrant de larges différences en termes relatifs dans les estimations du PIB par habitant en PPA entre les trois bases de données et de même pour les pays à revenu faible ou intermédiaire que pour le pays moyen (l'ensemble de notre échantillon de pays). Par exemple, les résultats montrent que la lutte contre la corruption est positivement et significativement associée au développement dans les pays où les différences entre les estimations du PIB par habitant en PPA sont les plus importantes quand on utilise le PIB réel par habitant provenant du PCI. Cependant, ce résultat ne tient plus lorsque les estimations du PIB par habitant en PPA provenant de WDI et de PWT sont utilisées.

Il est important pour les chercheurs et décideurs politiques de faire preuve de prudence lors de la formulation de politiques publiques car les différences de PIB réel selon les sources de données peuvent affecter les résultats.

### ***Inégalité d'opportunités***

En plus de l'inégalité des revenus, l'inégalité d'opportunités est présente et importante dans la plupart des pays dans le monde. L'inégalité des résultats observés et l'inégalité des opportunités sont très étroitement liées (Banque mondiale, 2016). Cette sous-section discute l'évolution des différents aspects d'inégalité d'opportunités, y compris l'accès à l'éducation, à la santé et aux services financiers, dans différentes régions du monde.

**Santé.** Il y a une grande disparité entre les plus riches et les plus pauvres en termes d'accès aux soins de santé, particulièrement dans les pays en développement. La Figure 1.7 illustre la couverture des interventions en matière de santé reproductive, maternelle, néonatale et infantile par quintile de revenus. La figure montre un grand écart entre les riches et les pauvres en termes d'accès aux soins de santé. Ce phénomène est plus prononcé en Afrique Sub-Saharienne. Au

Nigeria, 68,4 pourcent des 20 pourcent les plus riches ont accès aux interventions en matière de santé reproductive, maternelle, néonatale et infantile, comparé à seulement 13 pourcent pour les 20 pourcent les plus pauvres.

**Education.** Il y a également une importante disparité entre les plus riches et les plus pauvres en termes d'accès à l'éducation. Comme illustré sur la Figure 1.8, le nombre d'années moyen d'éducation pour les individus âgés entre 20 et 24 ans est beaucoup plus élevé dans le quintile le plus élevé (les 20 pourcent les plus riches) que dans le quintile le plus bas (les 20 pourcent les plus pauvres). Cet écart est plus prononcé au Nigeria où le nombre d'années moyen d'éducation pour les 20-24 ans est de 12,2 pour les 20 pourcent les plus riches de la société et seulement de 1,7 pour les 20 pourcent les plus pauvres. Cet écart est minime au Kazakhstan (13,5 pour les 20 pourcent les plus riches contre 11,6 pour les 20 pourcent les plus pauvres).

**Services financiers.** L'accès au financement est primordial pour les ménages, particulièrement pour les individus avec des revenus faibles. Les ménages, surtout celles qui sont pauvres, ont besoin de crédit pour avoir accès à des soins de santé, une éducation et une alimentation adéquats. Le manque d'accès à des services financiers appropriés peut donc générer des inégalités de revenus. La part des adultes dans le top 60 pourcent de la distribution des revenus ayant un compte bancaire est supérieure à la part des 40 pourcent les plus pauvres (Figure 1.9). Au niveau global, 65,7 pourcent d'adultes dans le top 60 pourcent de la distribution des revenus possèdent des comptes dans une institution financière. Pour les adultes dans la tranche des 40 pourcent les plus pauvres, le taux est de 53,3 pourcent. L'écart entre les deux groupes est plus large en Afrique Sub-Saharienne que dans les autres régions.

### ***Pauvreté***

Les comparaisons internationales de données de pauvreté posent beaucoup de problèmes. Premièrement, les mesures de pauvreté requièrent des données d'enquête auprès des ménages pour mesurer de façon fréquente le revenu ou la consommation et la distribution au sein des ménages. Cependant, les enquêtes auprès des ménages ne sont pas menées annuellement. Par conséquent, il faut des données supplémentaires pour produire des données fiables sur la pauvreté couvrant une longue période. Deuxièmement, les poids d'échantillonnage, qui garantissent que la représentativité de l'enquête à l'échelle nationale, sont nécessaires pour produire des estimations de la pauvreté. Cependant, les données du recensement, qui sont requises pour produire des poids d'échantillonnage, sont souvent de mauvaise qualité ou obsolètes. Troisièmement, les données démographiques sont également nécessaires pour

produire les taux de pauvreté et chiffrer le nombre de pauvres. En règle générale, les recensements de la population sont effectués tous les 10 ans (Banque mondiale, 2015). En outre, pour estimer le nombre de personnes dans le monde vivant dans l'extrême pauvreté, il est essentiel d'utiliser un seuil de pauvreté comparable d'un pays à l'autre. Les indices de parité de pouvoir d'achat (PPA) du Programme de comparaison internationale (PCI) sont utilisés pour ajuster les différences de coût de la vie entre les différents pays. Il est important de noter que les estimations de la pauvreté tendent à être sensibles aux changements dans les données de PPA (Banque mondiale, 2015).

Selon les données de la Banque mondiale, à travers le monde, le nombre de pauvres à 1,25 dollar a diminué de 1990 à 2008, mais il reste élevé essentiellement en Afrique subsaharienne et en Asie. Le taux de pauvreté extrême a diminué dans le monde entier au cours des deux dernières décennies, en particulier dans la région de l'Asie de l'Est et du Pacifique où les taux de pauvreté ont chuté de plus de 60% en 1990 à moins de 4% en 2013 (Table 1.9). Les autres régions, à l'exception de l'Europe et l'Asie centrale, ont également connu une réduction de la pauvreté, mais dans une moindre mesure. Malgré ces progrès enregistrés, le nombre de personnes extrêmement pauvres était estimé à 768,51 millions en 2013. Plus de la moitié des personnes extrêmement pauvres vivaient en Afrique subsaharienne en 2013.

## **Méthodologies économétriques et principaux résultats de la thèse**

Cette thèse met en exergue des recommandations de politiques économiques sur le rôle des politiques institutionnelles, fiscales et structurelles pour atteindre une croissance pro-pauvre et inclusive. Les sections suivantes décrivent les méthodologies et résument les principaux résultats pour chacun des trois principaux chapitres de cette thèse.

### ***A la recherche de la croissance pro-pauvre et inclusive : le rôle de la gouvernance***

#### *Méthodologies économétriques*

Le premier chapitre examine le lien entre la bonne gouvernance et la croissance pro-pauvre et inclusive au niveau macroéconomique. L'échantillon d'étude est constitué de 112 pays développés et en développement couvrant la période 1975-2012. Trois principales méthodes économétriques sont utilisées dans ce chapitre : le modèle de panel à effets fixes, les méthodes des moments généralisés en système (SYS-GMM) et le modèle de panel à transition lisse (Panel Smooth Transition Regression – PSTR).

Conformément à diverses études empiriques sur la croissance économique, le chapitre utilise 10 périodes non chevauchantes de quatre ans pour contrôler les fluctuations du cycle économique au cours de la période considérée (1975-2012).<sup>50</sup>

L'équation ci-dessous constitue l'équation de base de la stratégie empirique :

$$\ln Y_{it} = \beta_{\ln GDPpc} \ln GDPpc_{it} + \gamma \ln GINI_{it} + \beta_{Gov} Gov_{it} + \beta_X X_{it} + \alpha_i + \mu_t + \varepsilon_{it}, \quad (2.1)$$

Où  $Y_{it}$  est un vecteur constitué de trois variables indépendantes distinctes et qui sont des indicateurs de pauvreté et d'inclusion pour chaque pays  $i$  durant la période  $t$ : (i) le revenu des 20 pourcent les plus pauvres dans la distribution des revenus ( $yp_{it}$ ) qui provient de la base de données de Dollar-Kleineberg-Kraay<sup>51</sup>; (ii) le taux de pauvreté à 2 dollars par jour en parité de pouvoir d'achat (PPA) ( $P_{it}$ ) provenant des indicateurs de développement dans le monde (WDI) ; et (iii) la part de revenu des 20 pourcent les plus pauvres ( $Q_{it}$ ) de la base de données de Dollar-Kleineberg-Kraay.  $\ln GDPpc_{it}$  est le logarithme du produit intérieur brut (PIB) par habitant. Conformément à Ravallion et Chen (1997), le chapitre contrôle également le logarithme de l'indice de Gini ( $\ln GINI_{it}$ ) pour contrôler l'effet potentiel de la distribution des revenus sur la pauvreté.<sup>52</sup>  $Gov_{it}$  représente l'ensemble des six indicateurs de gouvernance (Être

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<sup>50</sup> La dernière période est la moyenne des deux dernières années. Les résultats restent inchangés quand les estimations de base sont reproduites sans les deux dernières années. Cette approche a été utilisée dans la littérature. Par exemple, Giuliano et Ruiz-Arranz (2009) ont divisé leur période d'échantillonnage en six périodes de cinq ans non chevauchants, à l'exception de la dernière période, qui est la moyenne des trois dernières années.

<sup>51</sup> Ces données sont construites à partir d'un ensemble de données plus large de 963 observations d'années-pays pour lesquelles des enquêtes auprès des ménages sont disponibles. La base de données résulte de la fusion de la base de données du Luxembourg Income Study (LIS), couvrant principalement les pays développés, et de la base de données PovcalNet de la Banque mondiale, qui couvre essentiellement les pays en voie de développement. Les moyennes des enquêtes LIS sont converties en dollars américains constants de 2005 pour être compatibles avec les données PovcalNet. L'ensemble de données Dollar-Kleineberg-Kraay couvre 151 pays sur une période allant de 1967 à 2011. Voir Dollar, D., Kleineberg T., and Kraay, A., 2016. "Growth Still Is Good for the Poor." *European Economic Review*, Elsevier, vol. 81(C): 68-85.

<sup>52</sup> La croissance du revenu moyen peut modifier la répartition des revenus, et en même temps les variations des inégalités peuvent également modifier la forme de la distribution des revenus. Ces deux effets peuvent avoir un impact sur les revenus des pauvres et les ratios de pauvreté.

à l'écoute et rendre compte, Instabilité politique et violence, Efficacité des pouvoirs publics, Fardeau réglementaire, État de droit et Maîtrise de la corruption) ainsi qu'un indicateur agrégé de gouvernance. Ce dernier est obtenu en utilisant la méthode d'analyse en composantes principales.  $X_{it}$  représente le vecteur des variables de contrôle. Cet ensemble comprend des variables liées à la santé, au capital humain, à l'infrastructure, à l'ouverture au commerce, à l'emploi et aux facteurs financiers. Ces variables de contrôle reflètent l'état de la littérature empirique sur les déterminants de la croissance économique et de la réduction de la pauvreté. Les effets spécifiques au pays sont indiqués par  $\alpha_i$ ;  $\mu_t$  correspond aux effets spécifiques au temps; et  $\varepsilon_{it}$  est le terme d'erreur variant dans le temps.

Outre les estimations à effets fixes, le chapitre utilise également la méthode des moments généralisés en système (SYS-GMM) pour traiter l'endogénéité potentielle résultant de problèmes de causalité inverse, tout en permettant un processus dynamique. Ce modèle peut être plus approprié quand on analyse des phénomènes qui persistent au cours du temps, comme la pauvreté et l'inclusion.

En plus d'analyser les déterminants de la croissance pro-pauvre et inclusive, ce chapitre étudie également une possible évidence de linéarité ou non-linéarité sous deux angles : (a) une différenciation en fonction de la qualité de la gouvernance et (b) une différenciation en fonction du niveau de développement. Le chapitre utilise deux types de tests. Le premier test utilise une estimation SYS-GMM non-linéaire exogène et consiste à diviser de manière exogène l'échantillon en fonction de niveau médian des variables d'intérêt (niveau de développement ou de gouvernance) en tant que point-seuil. Le deuxième test estime le modèle de panel à transition lisse (PSTR) développé par Gonzalez, Tersvirta et Dijk (2005), pour pallier les problèmes qui ont été soulevés dans la littérature sur la relation entre réduction de la pauvreté, la croissance économique et la bonne gouvernance, et de tester la robustesse des résultats de ce chapitre.

Le modèle PSTR, comparé aux modèles avec introduction des termes d'interaction et de la valeur médiane en tant que seuil exogène, a tout d'abord l'avantage de permettre au lien entre gouvernance et croissance économique de varier dans le temps en fonction du niveau de développement. Deuxièmement, ce modèle permet de faire varier la relation entre la croissance économique et le revenu des pauvres au fil du temps en fonction du niveau de la qualité de la gouvernance. La spécification PSTR considère la vitesse de transition d'un régime à l'autre. De plus, le passage d'un régime à un autre est graduel. En outre, il fournit les valeurs seuils (i) du niveau de qualité de la gouvernance et (ii) du niveau de développement à partir desquelles la dynamique des relations entre gouvernance, croissance pro-pauvre et inclusive change. Aussi,

le modèle PSTR étant un modèle à changement de régime, la variation des coefficients est graduelle et lisse.

Le modèle PSTR général permettant  $(r + 1)$  différents régimes s'écrit comme suit <sup>53</sup>:

$$y_{it} = u_i + \lambda_t + \beta_0 X_{it} + \sum_{j=1}^r \beta_j' X_{it} g_j(q_{it}^{(j)}, \gamma_j, \delta_j) + \varepsilon_{it} \quad (2.2)$$

Où les fonctions de transition  $g_j(q_{it}^{(j)}, \gamma_j, \delta_j)$ ,  $j = 1, \dots, r$ , sont comme suit:

$$g(q_{it}, \gamma, \delta) = \left[ 1 + \exp[-\gamma \prod_{j=1}^m (q_{it} - \delta_j)] \right]^{-1}, \gamma > 0 \text{ et } \delta_1 < \delta_2 \dots < \delta_m \quad (2.3)$$

avec des degrés polynomiaux  $m_j$ .  $\delta = (\delta_1, \dots, \delta_m)'$  est un vecteur de paramètres d'emplacement et  $\gamma$  représente le paramètre lisse.

Tandis que le modèle SYS-GMM traite des problèmes potentiels d'endogénéité, le modèle PSTR ne le fait pas. Par conséquent, pour traiter les problèmes potentiels d'endogénéité, les modèles PSTR utilisés dans ce chapitre utilisent des valeurs retardées de toutes les variables explicatives qui pourraient être endogènes (voir Allegret et al., 2014).

### *Principaux résultats*

Les résultats principaux montrent que la croissance a été pro-pauvre, c'est-à-dire qu'elle a été associée à une réduction de la pauvreté. Cependant, la croissance n'a pas été inclusive car elle n'a pas eu un effet significatif sur la croissance de la part du revenu des 20 pourcent les plus pauvres. Tous les indicateurs mondiaux de la gouvernance impactent positivement la croissance du revenu et la réduction de la pauvreté. En même temps, ce chapitre montre que seuls deux indicateurs : l'efficacité du gouvernement et la règle de droit favorisent une croissance inclusive. Les résultats du modèle de panel à transition lisse (PSTR) montrent que l'impact de la croissance sur le revenu des pauvres est non-linéaire et s'accroît avec le contrôle de la corruption. Cependant, la relation entre l'efficacité du gouvernement et la croissance inclusive est linéaire. Les résultats montrent également que l'éducation, les infrastructures et le développement financier sont des facteurs importants pour la réduction de la pauvreté et la

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<sup>53</sup> Dans ce chapitre, les tests retiennent des modèles PSTR avec une fonction de transition et deux régimes ( $r = 1$ ).



promotion de la croissance inclusive.

### ***Réallouer les dépenses publiques pour réduire les inégalités de revenus : Cela peut-il fonctionner ?***

#### *Méthodologies économétriques*

L'analyse dans le deuxième chapitre s'appuie sur la vaste littérature empirique sur les déterminants de l'inégalité des revenus, qui montre que le revenu par habitant, l'éducation, l'ouverture commerciale et l'évolution technologique sont les principaux déterminants des variations transnationales de l'inégalité des revenus (Barro, 2008; Woo et al., 2017). Tout en contrôlant les variables explicatives classiques, le chapitre innove en évaluant les effets de la réallocation des dépenses sur l'inégalité des revenus. Ce chapitre utilise une base de données, de dépenses publiques désagrégées, nouvellement assemblées pour 83 pays couvrant tous les groupes de revenu.

La spécification de la régression de base est la suivante:

$$\text{Log}(I_{it}) = \sum_{j=1}^n \delta_j S_{i,j,t-1} + \beta E_{i,t-1} + \gamma Z_{it-1} + \nu_i + \eta_t + \varepsilon_{it} \quad (3.1)$$

Où  $\text{Log}(I_{it})$  est le logarithme du coefficient de Gini du revenu disponible pour le pays  $i$  et l'année  $t$ .  $S_{i,j,t-1}$  capture la part de la composante des dépenses publiques  $j$  dans les dépenses totales.  $E_{i,t-1}$  représente le ratio des dépenses totales dans le PIB. L'introduction de cette variable nous permet d'isoler les effets de la composition des dépenses (Devarajan, Swaroop, and Zou, 1996).  $Z_{it-1}$  est un vecteur de variables de contrôle. Le modèle utilise la valeur retardée de toutes les variables explicatives pour réduire le risque de causalité inverse.  $\nu_i$  désigne les effets fixes spécifiques au pays (pour contrôler les facteurs propres à chaque pays, y compris la composante invariante dans le temps de l'environnement institutionnel) ;  $\eta_t$  représente les effets fixes temporels (pour contrôler les facteurs globaux); et  $\varepsilon_{it}$  est le terme d'erreur. Par construction  $\sum_{j=1}^n \delta_j S_{i,j,t-1} = 1$ . Cela implique que l'inclusion de toutes les composantes des dépenses dans une régression conduit à une multicollinéarité parfaite.

Comme dans Acosta-Ormaechea et Morozumi (2017), nous omettons un élément de dépense de notre équation empirique pour l'estimer.

En supposant que nous omettons le composant  $c$  de l'équation empirique, la spécification exclut

$S_{i,c,t-1}$  et devient:

$$\text{Log}(I_{it}) = \sum_{j=1}^{n-1} (\delta_j - \delta_c) S_{i,j,t-1} + \beta E_{i,t-1} + \gamma Z_{it-1} + \delta_c + v_i + \eta_t + \varepsilon_{it} \quad (3.2)$$

L'effet marginal de  $S_{i,j,t-1}$  sur  $\text{Log}(I_{it})$  est donc donné par  $\frac{\partial \text{Log}(I_{it})}{\partial S_{i,j,t-1}} = (\delta_j - \delta_c)$ .

Il reflète la différence des effets marginaux des composantes des dépenses  $j$  et  $c$  et reflète l'effet marginal sur l'inégalité des revenus de la réallocation des dépenses de la composante  $c$  vers la composante  $j$ . Nous nous référerons à la composante de dépenses  $c$  comme composante de financement.

L'approche principale, dans ce chapitre, pour estimer la régression avec données de panel est d'utiliser la régression par panel à effets fixes (FE) avec les erreurs-types de Driscoll-Kraay. Ce type de régression est robuste à des formes très générales de dépendance transversale et temporelle. La structure des erreurs est supposée être hétéroscédastique, autocorrélée jusqu'à un retard (pour tenir compte de la persistance de l'inégalité des revenus) et corrélée entre les panels (c'est-à-dire les pays) en raison de chocs communs tels que le commerce international.

### *Principaux résultats*

Ce deuxième chapitre analyse comment et dans quelle mesure un gouvernement peut réduire les inégalités de revenu en changeant la composition des dépenses publiques tout en gardant le niveau total inchangé. Cette question est d'une grande importance étant donné les contraintes de financement auxquelles font face la plupart des gouvernements, à cause d'un niveau élevé de dépenses publiques, de dettes publiques, des ressources domestiques limitées ou la combinaison des trois. Les résultats montrent que les réallocations de dépenses publiques vers les dépenses de protection sociale et d'infrastructures sont associées à une réduction des inégalités, en particulier quand elles sont financées par des réductions dans les dépenses de défense. Cependant, la situation politique et sécuritaire est importante. Le chapitre ne montre pas que la réduction des dépenses de défense pour financer les dépenses sociales et d'infrastructures améliore la distribution des revenus dans les pays ayant des institutions faibles et avec un risque plus élevé de conflits. Le chapitre montre également que réaffecter des ressources provenant des dépenses d'infrastructures et protection sociale vers d'autres types de dépenses tend à augmenter les inégalités de revenu. La prise en compte de l'impact à long terme des dépenses de santé, et en particulier des dépenses d'éducation, permet de mieux saisir leurs effets égalisateurs.

## ***Hétérogénéité dans le secteur informel et inégalité de revenu : le cas de la République Démocratique du Congo***

### *Méthodologies économétriques*

Le troisième chapitre utilise des données provenant des enquêtes 1-2-3 en République Démocratique du Congo et analyse l'hétérogénéité, l'inégalité et la performance des firmes dans le secteur informel. Plusieurs méthodologies sont utilisées dans ce chapitre : le modèle logit, le modèle probit, le modèle de Heckman en deux étapes, la décomposition de Blinder-Oaxaca et les Moindres Carrés Ordinaires (MCO). En plus, la principale méthodologie utilisée dans ce papier est la stratégie d'identification des trois catégories de firmes informelles comme cela a été évoqué dans Grimm, Knorringa et Lay (2012). Cette stratégie d'identification comprend trois étapes.

La première étape consiste à définir les entreprises-élite (top-performers) c'est-à-dire les entreprises les plus performantes en termes de capital physique et de valeur ajoutée. Ce chapitre définit les entreprises les plus performantes comme celles qui sont les plus productives de l'échantillon (les 50 pourcent supérieurs en termes de productivité du capital, c'est-à-dire la valeur ajoutée par capital physique) parmi les 40 pourcent supérieurs de la répartition du capital. L'accumulation de capital faisant partie du processus de croissance économique, elle est considérée comme un facteur précis d'identification d'une entreprise performante.

Dans la deuxième étape, les caractéristiques du propriétaire ou de l'entrepreneur et de l'entreprise sont identifiées et sont corrélées au capital physique et à la valeur ajoutée. Puis, la probabilité empirique qu'une entreprise soit élite (top-performer) c'est-à-dire hautement productive est évaluée sur la base de ces corrélations. La probabilité d'être une entreprise-élite est estimée en utilisant le modèle de Heckman (1979) pour corriger le potentiel biais de sélection à cause des valeurs manquantes dans la variable *capital*.

La troisième étape consiste à identifier les gazelles contraintes (constrained gazelles) et les entreprises survivalistes (survivalists). La probabilité statistique d'être une entreprise-élite pour chaque entrepreneur dans le pays est prédite. Cette probabilité est conditionnelle aux paramètres estimés  $\beta_0$  and  $\beta_1$  et au vecteur des variables observées  $X$ . Le modèle suivant est alors estimé:

$$\widehat{\Pr}(Y_i^{\text{Top}} = 1) = \theta(\hat{\beta}_0 + X_i' \hat{\beta}_1) \quad (4.3)$$

Où  $\hat{\beta}$  est le vecteur des coefficients estimés.

Pour déterminer les parts des deux autres segments, le seuil est sélectionné pour la probabilité prédite  $\widehat{Pr}(Y_i^{Top} = 1)$  entre les gazelles contraintes – un groupe d’entrepreneurs ayant des compétences managériales qui ressemblent à bien des égards à celles des entreprises-élite mais sont clairement différentes de celles qui caractérisent les entreprises survivalistes – et les entreprises survivalistes telle que la moyenne de cette probabilité prédite soit similaire dans le groupe des entreprises-élite et dans le groupe des gazelles contraintes. Cela suggère que la répartition des facteurs observables est la même dans les deux catégories et qu’en moyenne, les gazelles contraintes devraient être aussi performantes que les entreprises-élite. Les entreprises survivalistes sont définies comme toutes les firmes pour lesquels  $\widehat{Pr}(Y_i^{Top} = 1)$  est en dessous du seuil<sup>54</sup>.

### *Principaux résultats*

Le troisième chapitre fournit une perspective micro-économique, en étudiant comment la performance des firmes dans le secteur informel peut promouvoir la prospérité partagée<sup>55</sup>. Ce chapitre identifie empiriquement trois groupes de firmes informelles en République Démocratique du Congo, en utilisant les données de l’enquête 1-2-3. Le premier groupe de firmes (entreprises-élite) est constitué de firmes les plus performantes et qui opèrent avec un niveau élevé de capital. Le deuxième groupe (entreprises survivalistes) inclut des firmes qui ont des difficultés à croître. Le troisième groupe (gazelles contraintes) comprends des firmes dont les managers ont en commun un certain nombre de caractéristiques avec les managers de entreprises-élite mais opèrent leurs activités avec de plus faibles niveaux de capital comparés aux entreprises-élite. En utilisant des modèles logit et MCO (moindre carré ordinaire), ce chapitre montre que la pauvreté et les inégalités de revenu sont plus présentes parmi les gazelles

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<sup>54</sup> En tant que test de robustesse, le chapitre utilise le modèle de maximum de vraisemblance à information complète (Full Information Maximum Likelihood – FIML) pour estimer la probabilité d’être une entreprise-élite. Ce modèle FIML gère correctement les problèmes de valeurs manquantes en utilisant toutes les informations disponibles. Les résultats demeurent inchangés. Les deux groupes (gazelles contraintes et entreprises survivalistes) sont ensuite reclassés en utilisant les probabilités prédites basées sur les régressions du modèle. Les groupes de gazelles contraintes et d’entreprises survivalistes trouvés en utilisant les estimations à deux étapes de Heckman (1979) et le modèle FIML correspondent à environ 96%.

<sup>55</sup> La prospérité partagée se définit comme la croissance économique sans exclus. L’évolution du revenu des 40 pourcent les plus pauvres est l’indicateur utilisé pour mesurer la prospérité partagée.

contraintes et les entreprises survivalistes. Les inégalités de revenu sont principalement expliquées par les disparités en matière d'éducation entre les entrepreneurs et le manque d'accès au crédit. En outre, les résultats de la décomposition Blinder-Oaxaca montrent que la performance des firmes est un facteur clé expliquant les différences de revenu entre entrepreneurs. Le chapitre montre également que le capital humain et les qualités managériales des entrepreneurs sont des déterminants importants de la performance des firmes informelles.



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