The London School of Economics and Political Science

Groups, Location and Wellbeing: Social and Spatial Determinants of Inequality in Madagascar

Frank-Borge Wietzke

A thesis submitted to the Department of International Development of the London School of Economics for the degree of Doctor of Philosophy, London, October 2010

UMI Number: U615506

UMI

Dissertation Publishing

ProQuest®

Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

The copyright of this thesis rests with the author. Quotation from it is permitted, provided that full acknowledgement is made. This thesis may not be reproduced without the prior written consent of the author.

I warrant that this authorization does not, to the best of my belief, infringe the rights of any third party.

Abstract

This thesis studies non-monetary dimensions of wellbeing inequality in Madagascar from a geographic and group perspective (see Kanbur 2006, Stewart 2002, Barrett et al. 2005). The work opens with an introductory review of the growing importance of spatial and group-level information for the design of poverty alleviation policies. Chapter 2 presents a case study of historical inequalities in human capital accumulation among Christians and non-Christians in Madagascar. Detailed contextual and econometric evidence suggests that lower educational outcomes among non-Christians today originate in an uneven geographic distribution of Christian missionary schools over much of the 19th Century. Because spatial inequalities in school provision created at the time cut across contemporary religious divides, educational policies in favour of the non-Christian population will need to be accompanied by considerable investments in the public school network.

The second, more conceptual part of the thesis explores practical and analytical applications of the proposed group and geographic perspective in the context of the literature on programme targeting and wellbeing analysis. The first chapter in this section presents an asset index that allows for two-dimensional comparisons of interpersonal and spatial inequalities in the areas of public service provision and private wealth. In the context of Madagascar, this method suggests considerable reversals in geographic targeting priorities when compared to existing studies that rely on household consumption as the sole indicator of wellbeing.

The next chapter draws on group-level information to operationalize Amartya Sen's capability approach. While it is usually impossible to directly observe a person's capability set (the range of valuable outcomes an individual can theoretically achieve), this paper argues that an indication of the extent of capability inequality can be obtained by observing differences in wellbeing

outcomes across relevant groups or areas (see Roemer 1998). Applied to the analysis of interreligious and urban- rural inequalities in Madagascar, this method uncovers significant and persistent differences in wellbeing opportunity in a range of non-monetary dimensions. The last chapter concludes and identifies possible directions for future research within the proposed group-based approach.

Table of Contents

List of Tables and Figures

Tables

Maps

Figures

Acknowledgements

This thesis would not have been possible without the support of many people. At the London School of Economics, I am particularly indebted to my thesis supervisor Dr. Jean-Paul Faguet. Jean-Paul has guided this project with great patience, thorough advice and insightful comments and I am grateful for his support throughout my time at the LSE. Professor Nancy Cartwright at the Department of Philosophy, Logic and Scientific Method has prompted me to look beyond the simpler empirical questions of my research and to embrace more fundamental concerns about the methods and concepts used in the field of poverty and wellbeing analysis. Her insights were particularly fruitful during the early stages of this research and are reflected in the conceptual framework and chapter 4 of this thesis. Other advice and comments, ranging from the technical to conceptual were provided by Dr. Jouni Kuha, Dr. Diana Weinhold, Paula Giovagnoli, Dr. Lloyd Gruber, Professor Enrica Chiappero-Martinetti, Jose-Manuel Roche, Professor James Foster, Quentin T. Wodon, Johan Mistiaenen, and Peter Lanjouw. While the advice of all these individuals was invaluable, all of the remaining omissions and mistakes in thesis are my own responsibility.

The chapters of this thesis were presented at various stages in seminars at the London School of Economics, the University of Manchester and the Overseas Development Institute (ODI) in London. Draft versions of Chapters three and four of this thesis were presented at two conferences of the Human Development and Capabilities Association in New Delhi (September 2008) and Lima (September 2009). The feedback from seminar and conference attendants has helped me to refine my work and many of the comments received are reflected in the current versions of these papers. Moreover, I am particularly grateful to organizers of the second of the aforementioned conferences, where my paper on the measurement of capabilities was formally recognized as one of the most promising works by a young researcher.

The ideas presented in a PhD thesis often take root well before the actual research and writing process. In my case few of the conceptual proposals and empirical results presented here would have been possible without the practical insights I was able to gain over three years as a local governance advisor with the World Bank in Madagascar. At the World Bank I would like to thank in particular Dieudonne Randriamanampisoa, who patiently pointed out particularities about Malagasy politics and society that few foreigners would detect on their own. Jesko Hentschel was not only an inspiring manager, but was also the first person to point me to interdisciplinary approaches to the analysis of poverty and inequality that have deeply influenced this thesis. Outside the World Bank I am particularly grateful to Pietro Lupo, as well as to Mamisoa Rapanoelina and other staff at the government's community development project. Their great practical knowledge and insistence that methods for the identification of programme beneficiaries should not only be useful to poverty analysts at the national level, but also to programme administrators in the field, have left a deep imprint on the proposed targeting methodology in chapter 3.

Household surveys and administrative data used in this study were made available by the national statistics institute of Madagascar (INSTAT), the Measure DHS project at IFC macro, as well as the 'ilo' project, a collaborative effort of Cornell University and the national agricultural research institute FOFIFA. I am particularly grateful to Jean Razafindravonona, Bart Minten and David Stifel for sharing relevant data codes and programmes, as well as their insights from the collection and analysis of these data. Historical information on missionary activity that are used in chapter 2 were provided by the archives of the London Missionary Society at the Library of the School of Oriental and African Studies in London.

The Department of International Development at the LSE not only supported this project through several annual research grants, but also by providing a welcoming and calm research environment. In particular Stephanie

Davies was always accessible and efficiently resolved numerous administrative issues that could have slowed down the progress of this work.

Beyond the support received for my research, this thesis would not have been written without the help of my friends. Many of you were remarkably encouraging and patient when the writing yet again took precedent over other planned activities. Not all of your names can be mentioned here. However, I am especially grateful to Chris Humphrey, who has provided thorough editorial support in the final stages of this project; Francesca Bastagli, who shared probably unhealthy amounts of caffeine, along with ideas, thoughts, and every mood swing that accompanied this project; as well as to Julien Fron, Nickey Deely, and Paolo Zaide, whose good sense of humour has helped me in more ways than they can probably imagine.

Finally, this work would not have been possible without my parents Joachim and Christiane Wietzke. Not only did they never question my decision to go back to the relative insecurity of several years of student life. They also encouraged me to pursue this project in the way and in the time I felt was appropriate. I am deeply grateful for their support and dedicate this thesis to them.

Preface

Consider two children born in Madagascar to parents similar with respect to commonly analyzed determinants of a person's living standard, such as income, rural status, educational background, but who differ with respect to the religion of the household head. The first child, born into a household whose parents practice 'traditional' ancestral beliefs, has a probability of not attending primary school of about 39%. This is almost twice as high as the likelihood of non-enrolment of the second child, born to Christian parents (21%).[1]

Consider now a similar comparison along religious lines but add a spatial dimension. For much of the past 40 years individuals who were born in areas with historically higher proportions of non-Christians and lower levels of school provision have tended to leave schools earlier than their peers in mostly Christian areas, regardless of their own religious background. Likewise, children growing up in these areas today are still less likely to attend school, primarily because the public schools in their neighbourhood tend to be of lower quality and because there are fewer private facilities in their vicinity. Both of these differences in outcomes suggest that there are strong geographic differences in the accessibility of schooling that add to the already large gap in educational opportunities between Christians and traditional believers.

This thesis argues that social and spatial inequalities of the type observed in Madagascar provide a strong case to move beyond the more conventional individualistic approach to the analysis of wellbeing and to focus more on group-level or geographic determinants of poverty and inequality. A group-based perspective, as I will refer to it, would complement information on individual or household attributes and endowments with evidence on group and spatial

---

[1] Author's own estimates based on the Malagasy national household survey 2001. The data and estimation procedure are described in Chapter 2. The underlying regressions are estimated on the full rural sample and do not include community-specific controls.

influences on individual wellbeing.[2] For example, in the case of educational outcomes of non-Christians in Madagascar, a group perspective would base the evaluation of a child's educational opportunities both on relevant personal or household attributes such as gender, poverty or family background *as well as* on attributes of non-Christians that contribute to lower outcomes in this group (see for example Subramanian 2009, Rao / Walton 2004, Stewart 2005, Deneulin 2008, Teschl / Derobert 2008). In addition, a group-sensitive approach would aim to move beyond simple comparisons of group averages to incorporate group-specific contexts and attributes that may explain observed group differences. For instance, the analysis of the educational gap between Christians and non-Christians in Madagascar would take account of the spatial segregation of non-Christians in order to capture possible overlaps between these group-level differences and spatial inequalities, or to account for possible interaction effects among individuals in the areas with a highest concentration of non-Christians.

Of course numerous issues may arise with respect to research methods and data availability in the context of a group-sensitive approach. Within economics the question of group-based inequalities has traditionally not been prominent and widely used measures of inequality (such as the Theil index) rarely capture the effect of social relations between individuals or the groups they are affiliated with (Grusky / Kanbur 2006, Sen 2006, Stewart 2002). This implies in reverse logic that strategies to study group-related inequalities are not as well developed and that, as yet, no coherent group-based approach to the analysis of wellbeing has emerged. For instance, none of the group-sensitive measures of inequality reviewed for this thesis date back more than ten years.[3] In this short

---

[2] Of course the example has similar implications at a policy level. For example, while educational outcomes of the type observed in Madagascar may be addressed with a number of household targeted interventions (such as conditional cash transfers that are only paid out when all eligible children in a household attend school), a group-sensitive approach would almost certainly incorporate community-targeted interventions such as school investment programmes or community driven interventions. See Mansuri/Rao 2004 for an overview of these programmes.

[3] In my review of the literature, the first measure that incorporates information on group-level achievements into a person's wellbeing is in an article by George Akerlof and Rachel Kranton that discusses "Economics and Identity," published in 2000 in the *Quarterly Journal of Economics*. Note that other measures such as the Gini index or Sen's deprivation index (Sen

time no common group analytical framework has developed that would match the level of consistency achieved by the conventional individualistic approach.[4]

Similar issues arise with respect to the question of data availability. While recent data collection efforts have greatly improved the availability of micro and macro evidence on development and poverty trends for most low-income countries, many of the newly available data sources are not suitable for the type of in-depth analysis of social and spatial inequalities proposed here. For instance, household surveys used by much of the existing literature on poverty and inequality in developing countries do not always contain information on group categories that are perceived to be politically 'sensitive'—such as ethnicity or race[5]—while sampling frames are usually not designed to permit comparisons beyond relatively aggregate units, such as urban-rural strata or administrative provinces. Studies that use these surveys are thus often unable to assess and compare in detail alternative group divides or to investigate finer-grained overlaps between social and spatial dimensions of inequality, of the type observed in the preceding example from Madagascar. For example, while there is now a quickly growing literature on the effect of ethnic or religious fractionalization and polarization on wellbeing and development outcomes in low-income countries, most of this work is of the cross-country format and provides little information on locality-specific contexts of group interactions (Easterly and Levine 1997, Alesina et al. 2003, Montalvo and Reynal-Querol 2003, 2005, Collier and Hoeffler 1998). The ability of this literature to uncover

---

1976) take account of the rank order of groups and individuals. However, these indices also do not directly relate the evaluation of individual wellbeing to group-specific interactions or attributes.

[4] For instance in the individualistic approach a common framework is provided by a number of theoretical axioms that have guided the development of most conventional inequality and poverty measures. While group-sensitive measures may be developed under the same axiomatic framework, they usually violate a number of core properties of conventional poverty and inequality measures such as symmetry, transfers or sub-group consistency (see Chapter 1 below).

[5] For example, information on ethnicity is suppressed in publically available data sets for Kenya and Rwanda, two countries that have experienced severe ethnic tensions in the past. See for instance, https://international.ipums.org/international-action/variables/group/ethnic, last accessed May 20th, 2010.

more detailed determinants of social and spatial inequalities within countries is thus clearly limited.

In spite of these problems, there are strong arguments to move beyond these restrictions and to adopt a more group-sensitive approach, even if this requires additional efforts of data collection or if it extends the analysis into 'less rigorous' contextual methods of investigation. It is now widely accepted in the literature that strong differences in living conditions across groups or geographic regions may have a range of negative effects on individual and social living standards. For example Stewart has argued repeatedly that high levels of inequality between groups defined along social lines such as ethnicity, religion or race increase the risk of political conflict or even civil war (Stewart 2002, Stewart [ed.] 2008). Other authors have emphasized the link between group differences and economic inefficiency (Bourguignon et al. 2007a, World Bank 2006), as well as the effect of social inequalities on individual wellbeing and opportunities (Akerlof / Kranton 2000, Stewart 2005, de Barros et al. 2009). Yet, to identify responses that would mitigate these possible negative outcomes of high group inequalities it is evidently necessary to first understand why and to what extent certain groups are disadvantaged. And this will typically require research designs that extend the framework of analysis considerably beyond the simpler designs of survey-based poverty assessments that dominated the literature so far.

Another reason to adopt a more group-sensitive perspective is to improve the local relevance and intuitive appeal of poverty and inequality estimates. Over recent years there has been increasing recognition in the field of poverty and inequality analysis that conventional 'quantitative' estimates of wellbeing based on income or expenditure aggregates alone often do not capture locality-specific dynamics and manifestations of poverty. For instance, a growing number of poverty assessments in the developing world find that local populations assess their quality of life in dimensions other than income, such as education, health and the quality of their social interactions. In other cases local populations are concerned about locality and context-specific risks to their livelihoods that are

only incompletely captured by static observations of people's consumption (Booth et al. 1998, Chambers 1997). This reduces the local relevance of expenditure-based poverty estimates and has led to increasing calls for a more multidimensional and interdisciplinary approach to the analysis of wellbeing. For example, a large body of research now analyzes differences in individual wellbeing in terms of people's endowments with productive assets (land, capital) or other relevant "functionings" that matter for people's wellbeing opportunity (education, health, see for example Kakwani / Silver [eds.] 2006, UNDP 1990, Alkire / Foster 2008), while other poverty assessments now regularly combine conventional survey-based analysis with participatory research methods (see among others Kanbur [ed.] 2003, Booth et al. 1998, Bamberger [ed.] 2000).

The group-based perspective proposed here contributes a new 'structural' perspective to this growing interdisciplinary and multidimensional literature. For example, while recent research of non-monetary aspects of human wellbeing greatly improved our awareness about the inherent multidimensionality of poverty, it has often been noted that this new literature has done relatively little to explore structural and organizational features of societies and communities that are behind observed inequalities (Grusky / Kanbur 2006, Grusky / Weeden 2006, 2007). A more group-sensitive approach may help to address this shortcoming, both by adding information on relevant institutional, sociological and political contexts and by exploring group-specific interactions that may explain systematic inequalities in relevant monetary and non-monetary outcomes across groups, including the possibility that outcomes in multiple dimensions of wellbeing 'cluster' around certain social groups (see for example Stewart 2002, Grusky / Weeden 2006, 2007, Bourguignon et al. 2007a).

The chapters in this thesis aim to illustrate both the advantages of a group-based perspective and to offer practical examples of how such an approach may be implemented in the context of existing methodological and data constraints. The next introductory chapter reviews at more length the case for a group-based approach in the context of a recent shift in the literature from income-based to

multidimensional and opportunity-based measures of wellbeing. After identifying specific types of group-level inequalities and interactions that are not usually captured by purely individualistic analysis, this review documents that arguments about inequalities across group categories such as race, ethnicity or class are already of central importance for recent attempts to measure and conceptualize the principle of opportunity inequality. The chapter argues that this growing relevance of group-level information should also be reflected in a more comparative framework of analysis that is more sensitive to context-specific group cleavages and interactions that drive inequalities. The chapter then reviews practical and analytical challenges to integrate this new perspective in the context of existing approaches to poverty and inequality measurement. It also presents the policy context of Madagascar and outlines a number of recommendations for choosing analytical group partitionings that will guide the empirical work in this thesis.

Chapter 2 returns to the example of interreligious inequalities in educational outcomes in Madagascar and provides a more in-depth explanation of the causes of these differences. Following a review of the country context and the history of the Malagasy education system, this chapter suggests that the observed overlap between interreligious and spatial inequalities primarily reflects historical imbalances in the supply of formal education across groups and regions of Madagascar. In Madagascar, as in many other countries in sub-Saharan Africa, 19th century missionaries were the first providers of formal schooling. This created important inequalities in the availability of schooling between areas that had a stronger historical presence of missionaries and others that did not. Because subsequent investments in the public education system were never sufficient to ensure complete primary school coverage, these inequalities in the accessibility of formal education persisted over time, leading to higher rates of human capital accumulation in areas that benefited from missionary schools.

Subsequent analysis combining historical data, contemporary administrative statistics and information from household surveys demonstrates

that these historical inequalities are still reflected in very uneven geographic distribution of educational outcomes today. For instance, analysis across several age cohorts reveals that inhabitants of predominantly non-Christian areas have consistently lower educational attainments, even when the individual's own religious status is accounted for. This points to more complex interactions between religious affiliation, schooling and location than would appear under more conventional explanations of interreligious inequalities that only focus on group-specific beliefs or cultures. Moreover it implies that the design of policies put in place to address these educational imbalances would have to differ from more conventional responses to group inequalities. For example, in the case of Madagascar an appropriate policy mix would move beyond group-targeted affirmative action and anti-discriminatory measures to include also school investment and incentive programmes that are directly targeted to regions with a particularly high proportion of non-Christians.

The third chapter offers an example of how geographic inequalities in wellbeing may be analyzed in a context of incomplete analytical capacity and data availability. Drawing on so-called asset or basic needs approaches, an index is presented that approximates levels of wellbeing in Madagascar on the basis of a household's access to consumer durables, the quality of their dwelling structures and their access to a range of basic services and utilities such as water, sanitation and electricity. Compared to more conventional consumption-based measures, this approach has the practical advantage that information on assets and services is easier to observe and less prone to measurement error than household expenditure. Moreover, asset indices do not require local price data and are less affected by short-term fluctuations of expenditure. As such they circumvent many problems with the comparability (over space and time) of expenditure aggregates that have often plagued the consumption approach (Sahn / Stifel 2000).

In a second step, the analysis makes use of a feature of asset indices that is often overlooked but may have important applications in the context of spatial

assessments of wellbeing inequality: asset indices permit combining information on households' level of private wealth (ownership of household durables, dwelling structures) and their access to public services (utilities, schooling and so on) under the same conceptual framework. The chapter argues that this characteristic of asset-based indices may be used for two-dimensional comparisons of the wellbeing of households and regions with respect to their level of private wealth and their access to public goods.

A case study illustrates this procedure by comparing variations in overall asset wealth and the 'private wealth' component of the index (household durables and dwellings structures) across areas that differ in the level of relevant public utilities for which administrative data were available (water, electricity). This study finds strong overlaps between local levels of public goods provision and private wealth. At the national level, areas with better provision of public services also tend to record a higher wealth of its population. However, at lower levels of geographic aggregation this rank order reverses, and some areas with lower levels of public service supply begin to outperform areas with better public goods provision in terms of the average private wealth of the population. This finding points to finer-grained variations in local livings standards that would be omitted under simpler analytical frameworks that only look at household wealth or income in isolation.

The fourth and final chapter discusses how the proposed group perspective may help to operationalize Amartya Sen's capability approach. An often noted problem of the capability approach is that a person's capability set— the range of valuable doings or beings he can choose from—is not directly measurable. All that can be observed are the functionings actually chosen (achieved), while alternative outcomes that were available, but for various reasons were not picked, remain invisible to the analyst (Sudgen 1993, Comim 2008). In practice this has meant that most empirical applications of the capability approach have analyzed people's wellbeing only in terms of actually

achieved wellbeing outcomes (functionings). In contrast relatively few studies have looked directly at the degree of capability freedom in a society.

The chapter argues that a group-perspective may help to overcome this problem. In many countries, individual opportunities differ significantly across groups for reasons that are directly or indirectly associated with group membership. For instance, the empirical evidence discussed so far suggest that in Madagascar, traditional believers living in areas with a majority of non-Christians have consistently lower educational opportunities due to the historically lower level of school provision to these areas. Likewise, households in rural areas with lower levels of public goods supply benefit less from the intrinsic benefits of public services and also tend to have lower wealth. In the context of the capability approach, such systematic variations in individual opportunities may be used to infer individual capabilities via observed group-level inequalities.

This idea is formalized in an index that infers an individual's set of basic capabilities from information on average achievements of persons who live in similar circumstances/localities as the individual whose wellbeing is being analyzed. The index is then applied to a case study across religious groups and urban-rural areas in Madagascar. The case study finds that inequalities in capability freedom across these groups extend well beyond the dimensions of education and private wealth presented in the earlier chapters of this thesis. For example, while there appears to be an overall improvement in living conditions across the entire population of the island, traditional believers and populations living in rural areas do consistently worse in a number of wellbeing dimensions other than literacy, such as utility access, transport or media access. This suggests that growth and national development strategies need to be much more inclusive to overcome these structural inequalities in the distribution of wellbeing freedom within Malagasy society.

1 Introduction

1.1 The case for a group-based approach

The economic analysis of poverty and inequality has traditionally followed an individualistic format. Economists, more accustomed to the principle of methodological individualism than to alternative sociological theories of socioeconomic differentiation, typically conceive of inequality in terms of dispersions in individual achievement, measured on a vertical scale of income and explained almost entirely on the basis of variations in personal attributes and endowments such as education, ability or family background. The level of wellbeing in a society is then determined by the variation of individual incomes or the incidence and depth of individual states of deprivation in the population or its constituent sub-groups (see for example Atkinson 1970, Sen 1976).

Recent literature is more sensitive to inequalities at the group and spatial level. In the developing country context, a growing body of research now explores the relationship between political stability and 'horizontal inequalities'—differences between groups defined by social and cultural attributes, such as race, ethnicity or religion (Stewart 2002, Stewart [ed.] 2008; see also Esteban / Ray 2008, Easterly/ Levine 1997, Kanbur et al. 2009).[6] While the link between developmental outcomes and inter-personal income inequality is often tenuous at best (Collier 2003, Banerjee /Duflo 2003), this literature has frequently uncovered relatively robust correlations between the level of polarization and fractionalization between social and cultural groups and the probability of state failure or violent conflict (Easterly / Levine 1997, Montalvo /

---

[6] Others have looked at the relationship between conflict and spatial inequality (see for example Ostby 2008).

Reynal-Querol 2003, 2005, Alesina et al. 2003, Alesina / Ferrara 2005, Stewart [ed.] 2008, Collier / Hoeffler 1998).[7]

Another closely related strand of literature emphasizes spatial and group inequalities because of their instrumental importance for economic efficiency and growth. For example, the World Bank's World Development Report 2006 *Equity and Development* echoes a common claim in the literature by arguing that strong inequalities between regions or groups may lower economic outcomes through higher incidences of rent-seeking behaviour or by preventing the efficient allocation of jobs and other resources in a society. Accordingly, the report concludes that the equalization of social and geographic inequalities should become one of the central concerns of the development strategies of the World Bank and its partner countries (World Bank 2006, see also Bourguignon et al. 2007a and Rao / Walton [eds.] 2004 for similar claims at the local level).

In this thesis a group-based perspective is adopted primarily because of the strong link that exists between group membership and individual opportunities. It is well documented that in many societies, markets and political institutions are far from perfect and that cultural biases or social stereotypes lead to substantive levels of discrimination against members of disadvantaged groups. This often creates strong imbalances in the distribution of economic, social, cultural and political 'assets' across groups (Stewart 2002, 2009) and may lead to lasting restrictions to individual opportunities if self-depreciating beliefs are internalized by those who are being discriminated against (Steele 1999, Hoff / Pandey 2006, Burchardt 2009, Piketty 1995). Moreover, recent research provides increasingly robust evidence that in settings where group inequalities are associated with high levels of social and spatial segregation, these differences are further exacerbated by the breakdown of inter-group relations and the emergence or deepening of group identities and behaviours (Cutler / Glaser 1997, Borjas

---

[7] Note that the evidence is not yet conclusive on whether conflict is more likely to occur in societies with higher levels of group polarization or whether it is fractionalization alone that drives state failure.

1995, Betrand et al. 2000, Massey / Denton 1993, Laurence 2009, Bayer et al. 2005; Jones 1998, see also Barrett [ed.] 2005, Durlauf / Young [eds.] 2001, Rao / Walton [eds.] 2004).[8]

Differences in economic and social opportunities should be of concern to policy makers because they are by nature self-perpetuating. If certain groups have less access to important assets over generations or if group-related behaviours and social and economic segregation along group lines imply that members of disadvantaged groups invest less in their education and professional development, incomes are bound to diverge in the long run. In extreme cases this may lead to the emergence of veritable "poverty traps"—situations where the most deprived individuals never manage to escape poverty because the combined impact of their shortfalls in social and physical endowments persistently prevents them from building up a stable capital stock (Carter / Barrett 2006, Barrett 2006).[9] In other situations disadvantaged groups may be able to increase their incomes along with general improvements in living standards in the society. However, because their endowments and economic returns remain systematically beneath those of more advantaged groups, incomes continue to diverge over time. If these uneven group relations become embedded in the social and political institutions of a society, group inequalities may become increasingly self-reinforcing and change will only be achieved through substantive external interventions (Bourguignon et al. 2007a, Stewart 2009, Tilly 1998).[10]

---

[8] Another common claim is that social relations and group contexts may influence people's subjective wellbeing. Akerlof and Kranton (2000) argue that the type of group relations one entertains and the status of one's group in a society may have a direct effect on one's wellbeing and behaviour. Accordingly, they propose that information on the relative position of one's group should be incorporated into a person's welfare function (Akerlof /Kranton 2000: 217; see also Sen 2006, Stewart 2005, Subramianan 2009).

[9] In a common example of a poverty trap, the poor remain poor because they are malnourished or not healthy and thus lack the physical energy to engage in income-generating activities (Bourguignon et al. 2007a: 243). In another example, the poor are forced to disinvest in productive assets during times of economic hardship. This reduces their ability to pursue productive activities and may lead to self-perpetuating cycles of debt and dependency (see for example Carter / Barrett 2006).

[10] Bourguignon et al. (2007) refer to such a situation as an "inequality trap".

The challenge is of course how to analyze group-based determinants of opportunity. People have multiple associations, many of which are fluid and their meaning and relevance may change over time. This makes it difficult to categorize individuals for the purpose of analysis and may require researchers to prioritize certain spatial and group-related disadvantages over others. Moreover, data constraints and the practical difficulties of identifying social associations and attributing the effects of group membership on individual outcomes often limit the certainty of claims about group-related dimensions of opportunity inequality (Manski 1993, 2000, Durlauf 2002, Moffitt 2001).

It does appear, however, that in particular in the developing world, practical difficulties of identifying and measuring group influences are often exacerbated by a general lack of systematic analysis of group-based inequalities. 'Qualitative' disciplines such as anthropology, geography or sociology, which are traditionally among the most vocal critics of the individualism in economic poverty analysis, have often developed quite elaborate descriptions of the social identities and power relations that underlie social and political cleavages in the developing world. Yet traditionally the focus and comparative strength of these disciplines favours detailed contextualized descriptions of inter-group relations, while less emphasis is placed on the measurement of group inequalities. Accordingly, few of these studies provide the type of systematic quantitative evidence that would be needed to identify the groups most deserving of redistributive interventions (Chambers 2003, Appadurai 1989; see also Grusky /Kanbur 2006, Grusky / Weeden 2006).

Economists on the other hand have, over the years, provided relatively systematic evidence of group inequalities in low income countries (this happened primarily in the context of the literature on poverty targeting, or more recently in economists' research on ethnic or religious fractionalization and polarization discussed above). Yet much of the available evidence today is of the cross-country format and does not allow for tracing intergroup relations in specific societies in more detail. Moreover, it is probably no exaggeration to argue that,

where country level studies were carried out, the main concern of many economists was not always to identify the specific nature of the social and spatial relations that underlie observed group and geographic inequalities. For example, while group-level estimates of inequality and poverty in country-specific poverty assessments are usually subjected to extensive robustness tests to assess their sensitivity to the choice of wellbeing measures and indicators, it is relatively rare to find the same level of attention devoted to the question whether or why a chosen group category reflects the most salient cleavage in the society under analysis.

A central conviction that motivates this thesis is that even at given levels of data availability, usually much more could be done to identify and measure in more detail relevant social and spatial inequalities in wellbeing opportunities in many societies. The first methodological argument that underlies this thesis endorses a comparative and more contextualized approach to the measurement of group inequalities. To gain a thorough impression of the extent of inequality in a society it is necessary to understand what social and spatial cleavages differentiate its citizens, and this requires a level of attention to contextual detail that is not always found in the majority of statistical poverty profiles one encounters in the literature. However, very contextualized descriptions of inter-group relations should ideally be supported by relevant evidence on resulting group inequalities. As this chapter will suggest later on, this may imply a move away from more established ways of carrying out group-level analysis on both sides of the economics—non-economics divide and to turn to potentially more interdisciplinary formats that directly integrate information on relevant historical, geographic or political contexts with more systematic quantitative analysis of group inequalities.[11]

---

[11] More concretely, I suggest below that this may require closer collaboration with disciplines such as political science, geography or economic history. Of course, this trend is already reflected in recent economic literature that relies on geographic or historical information to statistically identify potentially endogenous relationships in the analysis of contemporary developmental outcomes (see for example Acemoglu et al. 2001, Bolt / Bezemer 2009, Becker / Woessman 2009). However, in this literature contextual information is often used for instrumental

The second, related claim made here is that often important progress can be made, simply by organizing group-level comparisons around alternative group partitionings that are potentially more 'salient' than more established group categorizations already used in the literature. For example, due to convention or the practical difficulties of identifying social associations, much of recent research on inequality and social mobility in economics and sociology has studied questions of social differentiation in terms of vertically arranged classes or status groups (in economics these are often approximated by people's income or educational quantile). Class and status are, however, not the only source of social divisions, and in many settings cleavages along the lines of race, language, religion, or people's place of residence are at least as important. For the analysis this means that a minimum requirement would be to combine the study of inequalities between vertical status groups with assessments of differences along relevant social, cultural and spatial lines (Stewart 2002). Moreover, this thesis argues that, wherever possible, the analysis should also take into account information on the social and spatial organization of relevant groups, in order to capture differences in socio-economic outcomes that arise from interactions and geographic externalities when individuals of similar background are concentrated in the same area. This entails linking the analysis of inequalities along class or cultural lines to the question of social and spatial segregation—an approach that is already reflected in much of the literature on urban inequality (see for example Durlauf 2002, Montgomery et al. [eds.] 2004). In addition, this thesis suggests that especially in contexts of imperfect data availability, readily available information on local levels of public goods provision and market integration often serve as a useful means to approximate more systematic differences in wellbeing opportunity.

Before developing this case for a more group-sensitive perspective at more length, it is useful to point to two conceptual choices that influence the

purposes—to design and motivate statistical identification strategies. This thesis argues that contextual information should be given more weight in its own right

discussion throughout this thesis. First, the question of group inequalities is addressed here from what now emerges as an egalitarian conception of the principle of opportunity equality (Roemer 1998, Bowles et al. [eds.] 1998, Loury 2002, Arrow et al. [eds.] 2000). In line with this literature, this thesis discusses people's opportunities primarily in terms of the distribution of economic and social endowments, such as education, material assets or public goods that enable individuals and groups to compete successfully in their societies. Other aspects of inter-group relations, such as rights to political representation or cultural self determination, are often equally important for groups' political and economic opportunities as well as their intrinsic levels of wellbeing. However, they are omitted here for the sake of a more focused discussion.

Another conceptual choice concerns the use of the 'group' term itself. In line with the preceding arguments this thesis adopts a broad definition of groups. Groups are identified interchangeably by economic or cultural categories, such as class, ethnicity or religion, by geographic locations, or by social networks within an area. Which group definition is the most appropriate will depend on the specific case study context. The identification of the most relevant group definition in each setting is one of the core objectives of the approach proposed here.

The aim of this introductory chapter is to motivate and outline in general terms the case for the proposed group-sensitive approach in the context of recent debates on welfare policy and opportunity equality. The next section reviews 'traditional' approaches to the measurement of group-level inequalities in the economic literature on poverty and inequality, and discusses in more detail the changing need for group-level information in the context of recent strategies to tackle poverty and social exclusion. Section 1.3. describes the egalitarian interpretation of the principle of opportunity equality followed here and discusses the role that group-level information plays in explaining, addressing and measuring differences in economic advantages under this framework.

The second half of the chapter turns to methodological implications of the proposed group-based perspective and outlines the context of the empirical and conceptual work that will follow in the substantive chapters of this thesis. Section 1.4. addresses important analytical challenges that may arise in the context of the measurement of group inequalities and discusses the case for the more comparative perspective proposed here. Part 1.5. outlines the political and economic context of my case study country Madagascar and presents some of the major empirical findings of this thesis. The final section concludes with a number of observations on the relationship between the proposed group-based perspective and recent literatures on multidimensional and interdisciplinary approaches to wellbeing analysis.

1.2   Groups and targeting

The economic literature has traditionally considered people's wellbeing primarily in the space of individual incomes. Poverty is defined as a shortfall of income or consumption below a level at which certain basic needs (such as for food, housing or clothing) cannot be satisfied.[12] Likewise, inequality is primarily considered as a dispersion of individual incomes. Group comparisons used in this context typically present little more than aggregations of individual outcomes. It is relatively rare that group relations are considered as determinants of wellbeing in their own right.

For example the literature on programme targeting uses group information primarily for instrumental reasons, to identify eligible beneficiaries of income transfers when individual income data are missing or too costly to analyze (Akerlof 1978, Ravallion 1992, Kanbur 1987). Especially in low income countries, where direct means testing is often impossible due to data constraints

---

[12] Alternatively, the poverty threshold may be set in relation to the general living standard in a society. This would imply a relative poverty line, which is usually set as a proportion of a society's mean or median income.

or limited administrative capacity, managers of welfare programmes often allocate resources to parts of the population with higher rates of poverty (common examples are groups defined by people's place of residence, race, or employment status), assuming that by prioritizing groups with a particularly high poverty incidence it will be possible to attain an acceptable level of targeting efficiency.[13] Poverty assessments produced under this framework thus usually contain detailed estimates of the incidence or depth of poverty across different regions or sub-groups in order to identify those parts of the population that should be given priority by poverty alleviation policies.[14]

In the economic literature on inequality geographic and group differences are primarily addressed in the context of so-called sub-group decomposable inequality measures.[15] Sub-group decomposable inequality measures, which include well-known measures such as the group or Theil indices or the coefficient of variation, have the useful property of allowing the division of the total estimate of inequality into a component that captures within-group inequality and a second part that measures between-group inequality. The within-group component is the average of inequalities inside groups, as measured by the dispersion of individual incomes (or other relevant outcomes, measured on a continuous variable) around the group mean. The between-group component, on the other hand, is the degree of inequality due to differences in the group means (see for example Kanbur 2006: 369, Shorrocks / Wan 2005).[16]

---

[13] Targeting efficiency in this context is usually defined by the rate of leakage of group-targeted transfers to the non-poor and the rate of omission of poor households in other non-targeted groups (see for example Ravallion 1992). A good illustration for the overall approach can be found in geographically targeted programmes. Programmes of this type typically target resources to geographic areas with higher concentrations of poverty, given that such areas are easier to identify by central programme managers than individual households. It is then expected that resources will be passed on by local administrators who are better able to identify the poor in their community.

[14] Most of these group-level estimates are based on sub-group decomposable poverty measures, including especially the well-known group of Foster, Greer, Thorbecke indices (see Foster et al. 1984).

[15] See Shorrocks 1980, 1984 for a discussion of the property of sub-group decomposability.

[16] Within-group and between-group shares are both typically weighted by the population share of each group, in order to give more weight to larger groups.

Expressed as the ratio of total inequality, the share of between-group inequality may then be used to determine the contribution of group differences to overall inequality. In the past, this feature has been widely used to address questions such as how much of overall spatial inequality can be attributed to inequalities between urban and rural areas or between provinces and municipalities of a country (see for example Sahn / Stifel 2003a and World Bank 2006 for illustrations, and Shorrocks / Wan 2005 for an overview of this literature). Other authors have drawn on these measures to estimate inequalities across economic sectors or between racial groups (see for example Galbraith / Berner [eds.] 2001, Elbers et al. 2008).

While both of these literatures have, over time, provided much of the available quantitative evidence on social and spatial inequalities in living standards in the developing world, the underlying individualism of the income-based approach has meant that usually little information is provided on group-specific determinants of wellbeing. In the literature on programme targeting the information provided on groups is typically little more than a breakdown of the incidence or depth of poverty by group (Dasgupta / Kanbur 2005: 282). Moreover, given the efficiency concerns that motivate the targeting approach, researchers have usually seen little need to incorporate more complex information on social associations or networks inside groups that may explain why levels of poverty vary across groups. For instance, the efficiency gain of a group-targeted programme over an individually means tested programme would be quickly lost if administrators were forced to go out and collect lengthy information on social networks and more fine-grained divisions within groups.[17]

Inequality comparisons produced by the standard inequality measures provide equally little information on the underlying causes of observed group differences. Derived as a simple statistical decomposition of the total level of

---

[17] Another common requirement is that group membership should be exogenous to poverty status, in order to avoid distortions if individuals change groups to benefit from a welfare programme. This requirement can be generalized to the case of opportunity-equalizing interventions described further below.

interpersonal inequality, the between-group component does little more than to summarize "in an accounting sense" (Kanbur 2006: 369) by how much inequality would be reduced if there were no mean differences between groups, while the within-group estimate captures no more than the weighted average of the dispersion of individual incomes within the groups (Shorrocks / Wan 2005). However, it is increasingly recognized in the literature that this format omits a lot of information that would be required to determine the social relevance of group inequalities. For example, Sen has repeatedly argued that the requirement that decomposability should work for all conceivable population sub-groups effectively deprives group-decomposable inequality measures of their ability to take into account interactions or experiences of relative deprivations across groups. "[M]athematically the demand that the breakdown works for every logically possible classification has the effect that the only measures of poverty or inequality that survive treat every individual as an island.... The mathematical form of decomposability has had the odd result of ruling out any comparative perspective (and the corresponding sociological insights), which is, in fact, fatal for both inequality evaluation and poverty measurement" (Sen 2006: 44).[18] Others have criticized that the practice of calculating the between-group inequality share as a ratio of total interpersonal inequalities presents an unrealistic benchmark to assess the relative importance of group differences in a society. Because there will typically be more 'natural' dispersion in incomes between individuals than between groups, estimates of between-group share of inequality produced under the conventional approach will always be unnaturally low. This reduces the usefulness of these measures for evaluations of the relative importance of group differences for the wellbeing of a society (Kanbur 2006, Elbers et al. 2008, Stewart et al. 2005, Shorrocks / Wan 2005, Lanjouw / Rao 2010).[19]

---

[18] In more technical terms this problem arises because the class of sub-group decomposable inequality measures does not take into account information on the ranking of individuals or groups. This is in contrast to measures that are sensitive to the rank order of individuals or groups, such as the Gini index or Sen's own S measure of poverty (see Sen 1976, 2006: 40ff).

[19] The recent literature has responded to this problem by changing the way the between-group share of inequality is calculated. For instance, Kanbur and Zhang (2001) propose a polarization measure that is based on the sub-group decomposable Theil index, but defines the level of

In the context of the recent literature on inequality and poverty, these shortcomings of the traditional approach to group-level analysis are a growing concern, primarily because there is increased recognition that groups and spatial attributes usually play a direct role in individual wellbeing. In many developed societies, where the problem of absolute poverty was largely eradicated by the introduction of public safety nets and redistributive transfers, recent debates emphasize social and sociological dimensions of inequality, such as 'social exclusion', 'new poverty' or the emergence of an 'underclass' of the long-term unemployed (Silver 1994, Loury 1999, Grusky / Kanbur 2006). Since these sociological dimensions of deprivation often coincide with strong incidences of social and spatial segregation among the most deprived individuals, policy responses now increasingly move away from strictly individually targeted income transfers to address social and economic constraints directly at the group or neighbourhood level (Durlauf 2003, Massey / Denton 1997, Massey 2007, Wilson 1987).[20] Likewise, in the developing world, where differences in wellbeing opportunity often coincide with geographic inequalities and uneven levels of public service provision (Appleton 2000, Sahn / Stifel 2003a, World Bank 2006), poverty alleviation policies typically incorporate a combination of targeted household transfers as well as larger-scale investment and community

---

polarization in a society as the ratio of between-group inequality to within-group inequality. This measure magnifies differences between groups when inequalities inside groups decrease, thus indicating higher levels of polarization in the society. Stewart et al. (2005) propose indices of group inequality that are based on a range of conventional measures (including the Gini or the squared coefficient of variance), but that are modified in such a way that only inequalities in group means are measured. An empirical case study using district level data from Indonesia demonstrates that inequality estimates produced by these indices often differ significantly from the results produced by more conventional measures of individual level inequality. Elbers et al. (2008) standardize the between-group share estimated by the group of Theil inequality indices by the maximum amount of between-group inequality that can be theoretically observed in a given society. This is achieved by ranking all individuals in the sample by order of their income and then dividing them into groups, following observed group sizes. Recalculations of the Theil index then give an estimate of maximum between-group differences that can be used to normalize the estimated between-group share in the actual population (see also Lanjouw / Rao 2010).

[20] For example a common concern in the context of educational or urban regeneration programmes is to change behaviours of selected members or role models within local peer groups. These interventions are expected to generate "multiplier" effects when behavioural changes of individuals who benefited from an intervention are imitated by other individuals who were not directly targeted by the programme (see for example Manski 2000, Durlauf 2002, Bobonis / Finan 2007).

development programmes that aim to improve living standards of entire regions or communities.[21]

In these policy environments, more detailed information on group- or location-specific determinants of wellbeing is typically needed for two reasons. At an aggregate level it is necessary to understand the nature of group-level determinants of inequality in order to be able to make appropriate choices on the design and targeting of welfare programmes. For example, Kanbur (2006) notes in the developing country context that in order to choose between projects that aim to reduce the incidence of poverty and inequality within a community and larger-scale investment programmes that aim to lift the living standard of entire groups or regions, policy makers need to first understand what factors drive observed differences between groups. This however, requires moving beyond simple descriptive estimates of differences in group means and poverty incidences and collecting at least some supportive information on group- or locality-specific contexts that explain variations in living standards.

Another reason to focus on group-specific processes is the growing recognition that individual outcomes are often affected by interactions at the group or community level. For instance, it is often claimed by the literature on segregation and urban inequality that individuals in more prestigious, better-paid professions in a community may provide role models for adolescents from less advantaged family backgrounds (Wilson 1987, Montgomery et al. [eds.] 2004). Higher degrees of heterogeneity in a community are thus often associated with more favourable group cultures and behaviours, while more homogenous and poorer communities are expected to impose stronger social constraints on their inhabitants. Others have argued that investments of wealthier households in private or public goods may have positive externalities for the living conditions

---

[21] Examples for the latter include large-scale infrastructure investments to equalize access to basic services across regions, or community-level interventions designed to strengthen social cohesion and organization within deprived communities. A recent review of community-level programmes by the World Bank estimated that these interventions accounted for $7 billion of the Bank's lending portfolio (see Mansuri / Rao 2004).

of entire communities and the poor, for example investments in public parks, schools, or private and public water and sanitation systems (see Dasgupta / Kanbur 2005, Subramanian 2009, Alderman et al. 2003).

Targeting strategies that take into account such interactions between the rich and poor within groups or communities may lead to significant reversals in targeting priorities, compared to the results of the more conventional approach to programme targeting. For example Dasgupta and Kanbur (2005) show that the assumption of community-wide externalities of the expenditures of wealthier households in a locality could lead to the seemingly paradoxical recommendation that programmes should target the poor in more affluent communities. This is because transfers to poor families may have a higher impact in better-off communities, where the recipients of a transfer can also benefit from public goods provided by non-poor households.

At the same time, the concern about community-wide externalities typically calls for more information on the nature of norms and interpersonal relations within a group or community. To target behavioural changes within local communities or peer groups it is necessary to understand in detail through what mechanism and networks group interactions influence individual decisions (if not how far relevant social networks extend within or beyond a community or group), as well as how actions of disadvantaged groups are constrained by local role models and norms (Durlauf 2003, Massey / Denton 1997, Wilson 1987). Likewise, in the context of very heterogeneous communities it may be necessary to take into account local power relations to avoid political dynamics that may pervert possible programme impacts. For instance, recent empirical and theoretical work suggests that funds intended for community targeted and managed interventions are more likely to be captured by local elites in more unequal communities. This applies both to local investment budgets administered by democratically elected local governments (Bardhan / Mookherjee 2006, 2010) as well as to funds that are managed by more informal community or beneficiary

associations (see for example Conning / Kevane 2002, Galasso / Ravallion 2005).[22]

1.3 Recent debates on opportunity equality

Other reasons to adopt a more group-sensitive perspective arise directly from within the literature on opportunity inequality. As was argued above, groups are often of substantial importance for a person's level of advantage and thus information on people's group associations will often be required to assess the full extent of opportunity inequality in a society. In addition, it is possible to identify a number of requirements for group-level information that arise specifically from within an 'egalitarian' interpretation of the principle of opportunity equality that has recently begun to dominate the literature. This egalitarian approach also provides the normative framework for this thesis. It is therefore useful to outline these requirements in more detail.

The case for the shift from conventional indicators of income or consumption to opportunity-based measures usually arises out of two criticisms of the income-based paradigm. The first argument typically made is that earnings or wealth are at best indirect measures of people's wellbeing, but that they provide insufficient information about their actual abilities to achieve outcomes that are intrinsically valuable. For example, Sen has repeatedly pointed out that individuals and groups often differ in their ability to transform resources available to them into relevant wellbeing outcomes such as being educated, well nourished or in good health.[23] Evaluations of wellbeing that only consider a person's income may thus omit important inequalities in actual living standards. Accordingly, Sen's own capability approach focuses on the freedom that different

---

[22] These problems of elite capture often overlap with interactions between social 'identity groups', defined by attributes such as caste, ethnicity and so on (see for example Besley et al. 2004, Dufflo, 2005).

[23] A stock example of Sen is variations in caloric requirements that are brought about by differences in individual metabolisms, physical activities or health conditions.

36

individuals enjoy to achieve basic wellbeing outcomes (functionings). In contrast, the capability approach puts less emphasis on the ownership of goods or welfare received from material consumption (Sen 1985, 1985a, 1993, see also Chapter 4).

The second argument arises from the fact that income on its own provides little information on possible unfair constraints that are faced by different individuals in their pursuit of their productive activities. For example, an individual's observed level of income may be considered as the joint result of a person's past or present preferences for free time and leisure, as well as other determinants that cannot be directly influenced by the agent, such as his/her innate ability, family background, or the level of public goods and professional opportunities made available under the prevailing social, economic and political institutions of a person's society. Most people would tend to agree that comparative statements about peoples' level of wellbeing should, preferably, only be made on the basis of the latter—the factors beyond an individual's control. In contrast, differences in outcomes that reflect voluntary variations in personal effort should not be of relevance for the evaluation (Bourguignon 2006: 76f, Dworkin 1981, 1981a).

While each of these two arguments provide a strong case to move from income to capability or opportunity as the main indicator of wellbeing, the exact way to operationalize this alternative conception of a social advantage has often been disputed.

Probably the most 'conventional' interpretation of the principle of opportunity equality is found in meritocratic systems of justice. A meritocratic approach entails that public or private positions for which individuals compete in a society should only be assigned on the basis of a person's ability and skills that are relevant for the position in question, but not on the grounds of other criteria that do not affect how effectively an applicant would fill in a position. For instance, arrangements where racial or ethnic minorities are systematically excluded from political offices, places at university, or higher paying sections of

the labour market, just because of their skin colour or ethnic background, would be considered as unfair under this conception of justice. Meritocratic policies would thus aim to remove any such barriers through appropriate anti-discrimination legislation or other procedural measures, to ensure that all eligible citizens enjoy equal access to relevant positions and resources.[24]

Meritocratic policies have a number of important arguments in their favour—not least that they provide a basic common denominator for most conceptions of social fairness now encountered in modern democracies. However, there is increasing recognition that the sole reliance on legal and procedural solutions emphasized under this conception of justice will often not be sufficient to tackle more pervasive group inequalities in societies with long histories or social or cultural discrimination. For instance, in the US, where open racial discrimination has been largely resolved by the introduction of anti-discriminatory legislation and affirmative action programmes, a large body of evidence suggests that inequalities along race lines persist because the black population continues to have systematically lower endowments with assets and skills. Typically these disadvantages are further associated with the segregation of blacks into deprived neighbourhoods and the lower quality of schooling provided to this group (see for example Wilson 1987, Cutler / Glaeser 1997, Borjas 1995, Durlauf 2003, Arrow et al. [eds.] 2005).[25] Since these inequalities

---

[24] Of course there are always limitations to what extent meritocratic reforms can succeed in contexts where discriminatory practices are deeply engrained in the social and cultural institutions of a society.

[25] Much of this evidence was produced in response to Richard J. Herrnstein's and Charles A. Murray's *Bell Curve* (Herrnstein / Murray 1994). Herrnstein and Murray argued controversially that a long history of segregation along social and racial lines had given rise to distinct differences in cognitive ability between blacks and whites, caused by, and passed on over time, through the genetic transmission of relevant skills. Because differences in inborn ability are not directly amenable to external intervention, the authors concluded on efficiency grounds that welfare policies should return to meritocratic principles, rather than to aim to rectify underlying inequalities. Recent research suggests that this link between cognitive ability and the economic performance of blacks was overstated and that other factors such as the quality and years of education, or the social environment in which a child grows up played a more important role (for example, see Arrow et al. [eds.] 2000 for a collection of articles on this debate). The sociologist William Lucius Wilson argued as early as the late seventies that inequalities between blacks and whites were no longer the result of outright racial discrimination, but of a more general process of class-based segregation. According to Wilson, increasing efforts of affirmative action in the US

limit the chances of blacks to successfully compete for positions assigned on the basis of qualification and ability, they impose serious limitations on the possibility to equalize economic opportunities under a purely meritocratic system.

Recent interpretations of the principle of opportunity equality, which also provide the normative framework for this thesis, aim to address these structural inequalities in people's advantage under a more 'egalitarian' approach. Remaining in the US context, Loury (2002: 112ff) endorses a principle of 'race egalitarianism' that would compensate black families directly for the persistent historical shortfall in social and economic endowments that resulted from the long tradition of racial discrimination (according to Loury, compensation would be achieved through 'positive discrimination' such as affirmative action programmes, targeted education initiatives and so forth). Similarly, a widely quoted proposal for a conception of opportunity equality by John Roemer (1998) is based on the idea that members of disadvantaged groups should be compensated for possible 'structural' disadvantages associated with their social background. According to Roemer, appropriate programmes of social justice would aim to equalize opportunities "before individuals enter the competition for jobs or other positions in their society." This would entail at a minimum that public expenditures for core services such as education are spread equally across all persons who are likely to compete for the same position (see for example Roemer 2002, 1998). However, in a more demanding interpretation endorsed by Roemer, redistributive policies would also compensate individuals for more fundamental disadvantages, such as lower inherited ability or lower aspirations caused by less advantageous social and family backgrounds (Roemer 1998, see also Bowles / Gintis 1998, Arrow et al. [eds.] 2005, Stewart 2009: 334).[26]

---

had given rise to the emergence of a black middle class, which replaced race with economics status as the driving factor of race-related inequalities in the US (this volume was fittingly entitled *The Declining Significance of Race*, see Wilson 1978). Wilson concluded that this new development required a shift in the focus of policies away from the removal of racial discrimination to confront directly "the pervasive and destructive features of class subordination" that lead to the increasing economic disadvantage of the emerging black underclass (Wilson 1978: 154).

[26] Sen's capability approach has close parallels to these egalitarian conceptions of opportunity equality. However, the notion of social advantage in the capability approach is more widely

In the context of this broader conception of opportunity equality, the need for more detailed group-level information may arise for two reasons. The first, less direct reason results from the strong role that social attributes, such as race, ethnicity, or religion play for the segregation of labour markets in many modern societies.

While individuals can be discriminated against on the basis of a wide range of person-specific attributes such as handicaps, age or even their physical appearance (Bowles et al. [eds.] 2005), discrimination will often be grounded in social categorical attributes that have wide social 'salience', such as gender, skin colour, language, or religion (Tilly 1998).[27] This strong link between a person's social attributes and his or her economic opportunities implies that empirical evidence produced to support the shift from simpler meritocratic systems of justice to costlier egalitarian interventions will often be organized around detailed assessments of inequalities between socially or culturally defined groups. As the example of race egalitarianism in the US above illustrates, political arguments in favour of egalitarian transfers of assets or educational resources to the black population requires demonstrating that race-based inequalities are not (only) the result of residual discrimination, but of broader shortfalls in the distribution of relevant endowments and attributes in the black population. To do so it is typically necessary to move beyond simple comparisons of the average achievements of black and white workers and to disentangle in more detail the different mechanisms that contribute to observed group differences.[28]

---

defined than the egalitarian proposals mentioned here. A more extended discussion of differences between these two approaches follows in Chapter 4.

[27] Another relevant category includes a person's place of residence. See for example Nunn et al. 2010, Nunez / Gutierrez 2004.

[28] For instance, the literature on race and gender-based earnings inequality increasingly employs so-called Oaxaca Blinder decomposition techniques. These permit the division of observed earnings differentials between relevant groups into separate components that relate to differences in the distribution of endowments and differences in returns to assets (see Oaxaca 1973, Blinder 1973, Elder et al. 2009). Alternatively, relevant information can be gained from appropriate contextual analysis or multivariate regression designs that control simultaneously for discrimination effects at the group-level and returns to individual skills and attributes.

The second reason is that constraints on individual abilities to compete successfully in the labour market may be explained by group-specific influences and attributes that are easily overlooked in purely individualistic formats of analysis. These more structural differences in advantage are often not taken into account as much of the existing literature under the new egalitarian framework of opportunity equality traditionally focuses on person- or household-specific determinants of opportunity.

For instance, human capital theory and so-called asset and endowment-based approaches, which will provide the conceptual framework for my discussion in Chapters 2 and 3 of this thesis, typically assume that a person's opportunity to escape long-term poverty is a function of *individual* attributes and resources. These commonly include a person's inherited skills and abilities, levels of education, as well as the individual's control over productive assets, such as land, capital and credit (Becker 1967, Chiswick 1988, Bourguignon 2006, Moser [ed.] 2007, Bowles / Gintis 1998, Hulme / McKay 2007). The level of advantage actually enjoyed by the person is then approximated by the sum of returns to these endowments, possibly adjusting for interactions and complementarities between individual attributes and assets (Stewart 2009), or for variations in household's access to savings and credit during the dynamic process of asset accumulation (Carter / Barrett 2006, Carter / May 1999, Baulch / Hoddinott 2000).

Likewise, a relatively rich literature on social mobility that has developed across the disciplinary divides of sociology and economics hypothesizes that individual advantages are primarily determined by household or family-specific transmission of human capital, skills and abilities.[29] Expressed as

---

[29] Sociologists have generally studied intergenerational mobility in terms of parent-sibling correlations between categorical (but sometimes hierarchical) status groups or class. Economists on the other hand traditionally conceptualized the mobility concept in terms of intergenerational correlations on continuous scales of parents' and respondents' income or schooling years. However, growing concerns about non-linearities in the intergenerational transmission process have lead to an increasing shift towards non-linear techniques (such as transition matrices). These

intergenerational correlations in incomes or educational attainment, this research has generally uncovered relatively robust relationships between individuals' achievements and the background of their parents (see for example Bowles et al. [eds.] 2005, Morgan et al. [eds] 2006, Fields 2006). Yet, traditionally the mobility literature has not studied differences in the intergenerational transmission of outcomes across alternative social or cultural divides such as race or language (Stewart 2009, for exceptions see Hertz 2005, Bowles et al. 2005, Bourguignon et al. 2007).

The analysis of opportunities in terms of individual attributes or the household-specific transmission of human capital is in itself not problematic and will—in many cases—be sufficient to account for a large part of the persistence of inequalities across groups. For instance, in settings where incomes are unevenly distributed across groups, systematic correlations between parents' income and the earnings expectations of their children would, on their own, explain the reproduction of group inequalities across generations (Stewart 2009).[30]

However, there is growing evidence that the effect of these individual or household specific influences often varies considerably across groups. For example, Hertz reports for the US that the intergenerational correlation of earnings is about 27 percentage points higher among the black population then white inhabitants (Hertz 2005). Work by the same author finds that black children who are born in the bottom quartile are nearly twice as likely to remain there as adults than white children whose parents had identical incomes (Hertz 2006). In

---

have stronger similarities with the methods employed by the class analytical tradition of mobility research in sociology (see for example Morgan 2006).

[30] Of course also more sociological notions of opportunity inequality may be expressed in purely individualistic attributes. For instance, concepts such as social exclusion are by definition multidimensional, and in many cases the disadvantaged position of the most deprived individuals or households can be quite adequately identified simply by focusing on multiple deprivations in a range of material endowments or skills. Likewise, sociologists have traditionally regarded the clustering of multiple social and economic attributes and (dis)advantages as a defining feature of the life chances associated with class affiliation (see for example Silver 1994, Wolff/ De-Shalit 2007, Gordon et al. 2000, Grusky / Kanbur 2006)

Brazil, Ferreira and Veloso (2003) find lower rates of social mobility in earnings among blacks and people of mixed background than among whites, much of which is explained by uneven rates in the intergenerational transmission of education (see also Bourguignon et al. 2007). Research in South Africa finds that, over a decade after the end of apartheid, the probability of being in the top income deciles decreases for blacks relative to the white population (measured over the period of 1995 to 2000). However, this study also finds evidence for the emergence of a black middle class among the young, educated urban black population (Burger et al. 2004).

Even though the reasons for these differences are not always clear, it should be expected that part of the explanation is related to constraints that are specific to, and will only be observed, at the group or spatial level (Stewart 2009, Durlauf 2002, Grusky / Kanbur 2006). These group- and location-specific determinants of variations in personal advantage are likely to be overlooked if the analysis of opportunities only focuses on individual attributes. Without claims for completeness, the following examples of group-specific determinants of opportunity inequality may explain some of these variations.

- *Geographic inequalities*. Research on economic geography suggests that, in addition to 'natural' geographic endowments such as climate or soil quality, spatial inequalities are often the result of 'second nature' or 'economic agglomeration effects' (see Kanbur / Venables 2005 for an overview of this literature). In areas with a stronger concentration of businesses, economic agents usually benefit both from reduced transaction costs and higher labour demand. In contrast, agents in more remote or less dynamic areas often experience considerably lower returns to their assets and investments than workers in more dynamic areas (see for example Kanbur / Venables 2005, Jalan /Ravallion 2002, Christiaensen et al. 2005). Moreover, it has often been shown that disadvantaged ethnic or religious groups tend to be segregated in the areas with the most adverse geographic conditions and lower levels of public service supply. Spatial inequalities thus often contribute directly to

differences along social or cultural lines (see Chapter 2 as well as Van de Walle / Gunewardena 2001, Baulch et al. 2002, de Haan / Dubey 2004, Kabeer 2006).

- *Differences in access and returns to relevant economic resources.* As argued above, contemporary or past discrimination on cultural or political grounds often limits the access of disadvantaged groups to basic assets. Moreover, the segregation of these groups into less productive sectors of the economy further reduces the returns to their labour and existing capital (Stewart 2009, Kabeer 2006). This creates lasting economic inequalities along group lines that can often only be overcome through significant redistribution of endowments across groups.

- *Inequalities in political representation.* Inequalities in the political representation of different groups are another feature of inequality that can only be observed at the group level. In settings in which disadvantaged groups are politically underrepresented, inequalities are more likely to persist in the longer run as it is less likely that authorities will outlaw unfair discrimination or redistribute resources to poorer groups (Heyer et al. 2002, Rao / Walton 2004, Stewart 2009: 327, Tilly 1998, Bourguignon et al. 2007a).

- *Attributes that are group-specific, not person-specific.* In addition to purely person-specific assets and attributes, people's opportunities may be affected by a range of other factors that are specific to, and more easily measured at, the group level. For instance, differences in cultural norms or social contacts and networks that are often associated with a person's 'social capital' are usually specific to the groups an individual belongs to. Since different groups tend to have social capital of different quality, the advantages associated with these social relations are likely to contribute to existing inequalities (Stewart 2009: 326).[31]

---

[31] More specifically, social capital theory typically assumes that poorer groups have "strong" or "binding" relations, which are closely knit and rarely extend beyond the immediate family, kinship group or ethnicity, while better off groups tend to have "weak" or "bridging" types of social capital, which involve fewer interactions and extend beyond the individual's closer social environment. While strong types of social capital are often believed to facilitate collective action

- *Behavioural adaptations and interactions at the group level.* Group identities and cultures or the experiences of repeated discrimination on grounds of a person's skin colour, caste or language may influence individual behaviours and aspirations through processes of social learning and individual adaptation (Steele 1999, Hoff / Pandey 2006, Burchardt 2009, Piketty 1995). Likewise, it is often argued that adolescents growing up in poorer and more segregated neighbourhoods are more likely to develop forms of 'deviant' behaviours often associated with poverty, such as early school drop out, teenage pregnancy or unemployment (see above).[32] Where this occurs, particular problems for the evaluation of individual opportunities arise because it implies that observed effort will not always be independently distributed of a person's social circumstance (Loury 2002, Bourguignon et al. 2007, Stewart 2009: 334, see also Chapter 4).

1.3.1 Groups and opportunity measurement

Another reason to adopt a more careful approach to the choice of group information arises from recent proposals to measure aggregate levels of opportunity equality that have come out of the egalitarian literature. In fact, while the traditional approach to the modelling of individual opportunities has often paid little attention to group-based determinants of social and economic advantage, most of these proposals already directly incorporate information on people's group backgrounds and social circumstances. While these new measures address many of the conceptual concerns of this chapter, the incorporation of

---

or risk sharing among group members, it is often argued that they constrain individual initiative and wealth accumulation (Granovetter 1973, Woolcock / Narayan 2000). It is important to note that the link from social capital to group outcomes is not clearly established. Moreover, social capital theory, like much of the conventional literature on economic behaviour, continues to assume a clear separation between individual preferences and the social relations of an individual. This distinguishes the social capital approach from more recent models of group interactions and behaviours, which view individual preferences as endogenous to social contexts (see for example Barrett ed. 2005, Durlauf / Young ed. 2001).

[32] These behaviours are usually transmitted through the absence of local role models or social interactions within local peer groups, which work independently of behavioural adaptations at the family or household level (Wilson 1987, Durlauf 2002, Cutler / Glaser 1997, Borjas 1995, Case / Katz 1991, Bertrand et al. 2000, Massey / Denton 1993).

group-level information raises new analytical and practical challenges that need to be taken into account in the interpretation of opportunity estimates produced under this framework.

The most widely used approach to the estimation of the extent of opportunity inequality in a society—which will also serve as template for my analysis of capability freedoms in Chapter 4—was proposed by John Roemer (1998).[33] In Roemer's proposal the population is first divided into a number of mutually exclusive 'types' or circumstance groups, each of which is meant to capture the combination of assets, skills and social and genetic endowments typically available to individuals in the same circumstance group. The level of unfair disadvantage in a society is then estimated through the share of overall inequality that is due to differences in outcomes across types. While 'types' in Roemer's approach are often defined on the basis of personal attributes such as parental background or education, they also routinely include social and spatial identifiers such as race, ethnicity or place of origin (see Roemer 1998). In contrast, dispersion in outcomes within each circumstance group is associated with variations in individual effort and is thus not considered to be of relevance for the normative evaluation of the level of fairness in a society. This approach now serves as a template for a fast-growing empirical literature on inequalities of opportunity in the developed and developing world (see Roemer 2002, Bourguignon et al. 2007, Ferreira / Gignoux 2008, Checchi / Peragine 2005, de Barros et al. 2009)[34]

---

[33] A related proposal is found in Bourguignon et al. 2007a. These authors argue that, to demonstrate the existence of unfair limitations of opportunity in a society, a minimal requirement is to show that certain groups of the population do persistently worse than other groups in terms of power, wealth and status—a state that the authors define as an "inequality trap". In practical terms this would be accomplished by demonstrating at least first- or second-order stochastic dominance of the long-run distribution of outcomes across at least two comparison groups (see Bourguignon et al. 2007a: 243; also Lefranc et al. 2008).

[34] Note however, that there are differences in the way this literature operationalizes Roemer's proposal. One approach, also followed in Chapter 4 of this thesis, is to rely on sub-group decomposable inequality measures to rank alternative distributions (see for example Checci / Peragine 2005). Another solution is to calculate the effect of different circumstance factors parametrically and to use the resulting estimates to decompose overall inequality into a component associated with differences in circumstances and another associated with effort (Bourguignon et al. 2007, Ferreira / Gignoux 2008). The distinction of exogenous circumstances

While the approximation of individual opportunities through a person's social and group background already incorporate many concerns about determinants of opportunity inequality that are not person specific, the direct use of group-level information in the evaluation has a number of methodological implications that need to be taken into account when these approaches are applied to assess the level of fairness in a society.

The first consequence is that measures that use group information in the analysis of wellbeing inequality will violate a number of core axioms that are commonly required of indices employed by the literature on poverty and inequality measurement. For example, the so-called symmetry axiom entails that an estimate of poverty or inequality should not be affected by any inter-personal permutation of incomes.[35] But an exchange of incomes between two persons belonging to different groups or communities may alter the mean outcomes of the groups each person is associated with—with evident consequences for the estimates of the extent of overall opportunity inequality produced by the new measures. Likewise, the so-called transfer axiom requires that a rank-preserving transfer from a richer poor person to a more seriously deprived person should lead to a reduction in the absolute measure of poverty and inequality. However, when a progressive transfer occurs between a better off individual in a relatively

---

and personal effort that underlies all of these approaches is often complicated by the fact that personal effort is, itself, often co-determined by people's social and family background. To account for this, Bourguignon et al. (2007) estimate an upper and a lower bound for the level of opportunity equality in a society (Bourguignon et al. 2007). A third proposal, recently used by the World Bank to measure inequalities in opportunity in Latin America, focuses on group-specific inequalities in the access to basic services commonly considered to be important determinants of wellbeing, including education, sanitation and housing. This method is based on the dissimilarity index (D) often used in n sociology to measure differences in dichotomous outcomes. The index is the weighted average of the absolute differences of group-specific access rates from the overall average access rate in the population. Access rates are again estimated parametrically and weighted by group sizes (see de Barros et al. 2009). See also Ferreira / Gignoux 2008 for an overview of the different estimation methods available in the literature.

[35] Essentially the symmetry axiom ensures that poverty and inequality estimates are not affected by the social identities of the individuals whose wellbeing is being analyzed. For example a poverty comparison between Peter and Paul should be indifferent to whether it is Peter or Paul who lives in poverty. All that matters is the absolute degree of poverty / inequality between these two persons.

poor group to a more deprived individual in a richer group, group-specific means may again change in a way that would affect the estimated level of opportunity inequality in a society (Dasgupta / Kanbur 2005, Subramanian 2009: 74, Sen / Foster 1997).[36]

Another perhaps more important implication is that the new generation of measures of opportunity equality are much more sensitive to the choice of group partitionings than conventional inequality indices, known from the income paradigm. For instance, while the requirement of perfect sub-group decomposability in 'conventional' inequality measures such as the Theil or the coefficient of variance indices creates the aforementioned problems to group-specific attributes and interactions into the evaluation of inequality (Sen 2006), the decomposability property has the (rather convenient) implication that inequality and poverty estimates produced by these measures are 'robust' to the definition of the sub-groups used to divide a population. Since the estimates of within and between group-level inequality are nothing more than summary statements about the differences in group means and the extent of dispersion in individual inequalities within each group, the absolute estimate of inequality for the population will not change, regardless of how the population is divided into its constituent sub-groups.[37]

In the case of most new measures of opportunity inequality, this is not given, as estimates of the level of unfair disadvantage in a society are directly

---

[36] Another likely casualty in the specific context of poverty measurement is the focus axiom. This entails that the analysis of wellbeing should only incorporate information on the living standard of the poor, but not the non-poor.

[37] This property is also closely related to the axiom of 'sub-group consistency'. This requires that any change in inequality / poverty in any conceivable sub-group of a population must be reflected in a corresponding change in the aggregate measure of inequality or poverty for the entire population (see Sen / Foster 1997: 157 for a more extensive discussion). Note that a violation of sub-group consistency must not be a problem in itself. For example Sen has frequently argued that sub-group consistency should not be insisted on under all circumstances, especially if there are legitimate concerns to incorporate information on social interdependencies within and across groups into the analysis. Accordingly, the inequality-sensitive deprivation measure he has proposed in his own work (the S measure) knowingly violated axioms such as sub-group consistency in order to capture social interactions between individuals and groups (Sen 1976, Sen / Foster 1997). However, it is important to acknowledge the importance that underlying group definitions play for the evaluation of overall wellbeing when sub-group consistency is not given.

related to group inequalities that are observed across *specific* population partitionings. For example in the case of the measures of opportunity inequality proposed by Roemer, or the measure of capability inequality developed in Chapter 4 of this thesis, the overall estimate of the degree of unfair disadvantage in a society will be a direct function of the difference in observed outcomes across population groups or Roemerian 'types'. These group differences will vary with every new partitioning chosen for the analysis. Estimates of opportunity inequality, or the ranking of different populations according to these measures, are thus not robust across alternative group partitionings.

Both of these observations have one same simple but potentially far-reaching implication: statements about the level of fairness in a society made on the basis of these measures are highly sensitive to prior assumptions an analyst makes about the structural distribution of advantages across relevant groups of a population. Whether these assumptions, and the resulting measures, can be considered as 'legitimate' in a particular context is a question that can only be resolved on a case by case basis and will typically require more extended justifications of the particular choice of group partitioning that supports the analysis.

In practical terms this again implies a departure from some of the more established practices in the economic analysis of social inequality and a much stronger role for context. For instance, while robustness tests traditionally only involved assessments of the sensitivity of inequality estimates to the choice of particular inequality indices or wellbeing indicators, sensitivity analysis in the context of the new literature on opportunity measurement should ideally also incorporate the question of the choice of group partitionings into the evaluation. This applies in particular to cross country comparisons, where the range of possible group partitionings is typically more constrained, due to data limitations and concerns about comparability. In other contexts, the legitimacy of opportunity estimates and resulting policy conclusions may be increased by providing evidence demonstrating that the group categories used indeed capture

'salient' inequalities in wellbeing opportunity in a society. Each of these extra steps would increase the workload associated with the evaluation. However, as will be argued below, the added comparative evidence on social and spatial inequalities produced in the context of these robustness tests would contribute to a deeper understanding of the nature of social inequalities in the society being analyzed.

1.4 Choosing group partitionings

An important question for any study that aims to be more sensitive to group inequalities needs to answer is how relevant cleavages and group-specific relationships should be identified in practical research settings. This problem, which is not easy to resolve under any group-based format of analysis, is becoming even more difficult as the focus of attention shifts increasingly towards finer-grained social associations and group interactions.

Social networks and behavioural adaptations at the group level, identified as an important determinant for individual opportunities in the recent literature on social exclusion and the 'new poverty' (Silver 1994, Loury 1999), are notoriously difficult to identify in the survey or census data sets typically available to quantitative analysts. The empirical literature on social interactions thus typically approximates relevant social associations, such as by analyzing behavioural spill-overs between individuals within the same communities or neighbourhoods (which are often further proxied by census tracts, rather than accurate geographic definitions of neighbourhoods). Yet, as most authors of these studies readily acknowledge, these approximations are often highly inaccurate and may lead researchers to overlook important interactions within or between the spatial units chosen for the analysis (Dietz 2002, Manski 2000). Moreover, there are well-recognized problems to statistically distinguish the effects of these group

interactions from other unobserved household or locality-specific influences (see for example Manski 1993, 2000, Moffitt 2001).

Even in cases where group lines seem to be more clearly defined, serious difficulties of classifying individuals into relevant categories may arise. It is widely accepted that seemingly clear cut sources of group identity or conflict, such as race, ethnicity or religion, do not represent primordial realities, but are socially constructed and often publically contested (Stewart 2002, Kanbur et al. 2009).[38] This not only makes it difficult to define group categories for analytical purposes (Kanbur et al. 2009). It also implies that the meaning of group categories may change across time and contexts, or that people may find it difficult to categorize themselves when questioned about their group membership. For instance, it is often noted that respondents of census' or surveys tend to misreport their group status, especially if they belong to groups that are stigmatized in their societies (see for example Stewart et al. 2005:8). In other contexts individuals may be uncertain about the interpretation of a group category presented to them, or the categories offered by a researcher may be inappropriate to capture relevant social identities.[39]

To make matters worse, social classifications used in the analysis are usually not independent of the very institutions and policies that would normally address group inequalities. For instance, the very fact of classifying individuals into social, racial or linguistic categories in the context of a population census or survey may alter or deepen existing identities (Kertzer / Arel [eds.] 2002).

---

[38] For example, the literature on ethnic conflict in modern Africa is replete with accounts demonstrating that ethnic divides at the root of many political tensions today often originated from attempts by colonial authorities to classify African subjects, or to break local resistance through deliberate policies of divide and rule (see for example Mamdani 1996, Stewart 2002). The social and political meanings of these ethnic divides are still being redefined and—in some cases—instrumentalised by political rulers in ways that reinforce existing group differences and identities. Examples include recent discrimination against Christians and animists in southern Sudan, or the politically encouraged violence against Tutsis in Rwanda.

[39] For example Figueroa / Barron 2005 report for Peru that language, which is widely used to distinguish indigenous people from better off *mestizos*, fails to indentify large parts of the indigenous population who speak Spanish for historical reasons. Accordingly these authors propose to approximate indigenous status by a person's place of residence.

Likewise, it is often noted that welfare transfers or affirmative action programmes that are specifically targeted to disadvantaged groups and individuals may arouse the hostility of non-favoured groups or be stigmatizing to the beneficiaries of these programmes. In all cases, interventions originally devised to reduce group differences may fail to overcome social divides and contribute to the deepening and persistence of group identities (Gurr 2000, Stewart et al. 2005, 2007).

Even when these problems of measuring group associations are taken into account, another question is how one should choose particular group partitionings for the analysis. In most cases, individuals can be classified in multiple ways, depending for instance on their place of residence, language, ethnicity, gender or their social associations. Each of these categorizations will correspond to different types of disadvantage experienced by an individual or group. Yet, as was just argued, measures of opportunity inequality now proposed in the literature are highly sensitive to the way the population is divided into groups for the purpose of analysis. The choice of underlying group partitionings thus has potentially important implications for the statements one makes about the degree of opportunity equality in a society.

The literature on group inequality has typically responded to this problem by relying on various forms of public consensus or people's own perception of what constitutes 'salient' cleavages in society. For example, Stewart (2002) has argued that, in the context of strong horizontal inequalities and possible inter-group conflicts, assessments of social differences should concentrate on group definitions that are generally perceived as socially significant in a society, including "self perceptions of those 'in' the group and perceptions of those outside the group" (Stewart 2002:6). Similarly, Roemer (1998) has suggested in the context of the debate on opportunity inequality that the 'circumstance groups' used to estimate the extent of unfair disadvantage under his measure of opportunity inequality should be defined in consensus by the populations and

decision makers who will be charged with the funding and implementation of possible redistributive programmes.[40]

While consensual solutions of this type will often help to capture cleavages with a high degree of political or social 'salience', it may be questioned whether inequality comparisons that are based on subjective or publically recognized group categories alone will always be appropriate to identify more fundamental inequalities in a society. If, as was just argued, group differences are—to some extent—endogenous to the political and cultural institutions of a society, it is always possible that groups may exist that are equally deserving, but less vocal or visible than other more prominent groups. An overly pragmatic approach may overlook such group differences and thus contribute to the perpetuation of vested inequalities in the society whose wellbeing is being analyzed. For example, strong inequalities in educational attainments between Christians and adherents of traditional religion in Madagascar reported in Chapter 2 of this thesis went unnoticed by earlier policy debates in the island, which usually focused on politically 'more salient' ethnic and spatial cleavages (see below). Yet, the non-Christian population that is affected by these shortfalls in schooling accounts for a sizeable proportion of all inhabitants (about 40%). Any attempt to foster a more equitable distribution of schooling in the country would thus meet with little success unless this dimension of educational inequality is addressed.

All of these problems of identifying relevant group partitionings may be employed as arguments against the group-sensitive perspective proposed here. However, this thesis is motivated by the belief that they usually represent a case for more, not less research along group lines. Two primarily pragmatic arguments underpin this position.

---

[40] Other studies make group choices on simple grounds of data availability, for instance by choosing categories that are already included in the data set or that permit comparisons across multiple countries (see for example World Bank 2006:28).

The first conviction is that, while the intrinsic difficulty of measuring group inequalities cannot be negated, often there simply does not appear to be sufficient evidence on relevant social and spatial inequalities to reliably assess the wider validity of specific claims about group-related inequalities. For instance, disagreements about the salience of a particular group classification may reflect legitimate arguments about the structures and causes of inequality in many societies. However, these debates are not helped by the lack of comparative and systematic information on the underlying structures and causes of social and spatial inequalities in many countries. Likewise, concerns about the validity of a particular group categorization may be grounded in real difficulties of reducing naturally fluid and negotiable social identities into a relatively small and rigid number of categories. Yet they may also reflect a general failure to carefully test and validate these indictors (and the instruments used to collect them). In both cases, more carefully executed and possible explorative and methodologically innovative research, and the validation of information on group differences against multiple data sources and contexts, may help to provide the cumulative evidence that would be required to dispel concerns about the reliability of group-level comparisons of inequality.[41]

The second conviction is that, even when the problems of group-level analysis are taken into account, there are usually underexploited possibilities to incorporate more relevant information on social and spatial inequalities into the study of people's wellbeing opportunities. Because the question of group

---

[41] Some examples for this type of analytical progress already exist in the literature on social and spatial inequality. For instance, in spite of the aforementioned problems of measuring social interactions, the literature on urban inequality did manage to identify patterns and consequences of social and racial segregation that are now widely used in the academic and policy debate. Similarly, in the UK, where a particularly strong sociological tradition of class analysis exists, multiple categorizations of economic class have emerged that are now widely used outside the domain of sociology, to study questions of social mobility and welfare policy (see for example Savage 1997).This is despite the well acknowledged difficulties of classifying individuals into economic classes (Morgan 2006, Grusky / Kanbur 2006). Note also that many of the concerns raised about the reliability of measures of social advantage group analysis are not unique to the field of group-level analysis. For example indicators of school quality or literacy all involve multiple problems of measurement and standardization. However, it appears that concerns about these measures are gradually overcome as more evidence on these indicators is being accumulated.

partitionings was not always of central concern for a lot of previous research on social and spatial inequality, it is likely that in many cases analytical progress can be made simply by analyzing opportunities and outcomes along group lines that replace or run across more established partitionings. For instance, one conclusion that emerges from the recent literature on 'horizontal' inequalities is that, in settings with a strong history of cultural discrimination, important insights can be gained by combining the analysis of more widely studied indicators of vertical stratification (such as class, income, education) with information on the specific constraints faced by socially or culturally defined identity groups (Stewart 2009, Loury 1999). Cultural and economic discrimination, as well as reforms to rectify these practices, often create structures of social differentiation that run across more established lines of class (see above). The inclusion of information related to these processes may therefore help uncover additional divides that would be overlooked in simpler research designs. Moreover, as the literature on urban and social inequality illustrates, the relevance of comparisons along economic or cultural lines is usually further enhanced by the incorporation of information on the spatial organization of relevant groups. For instance, individuals in highly segregated poor neighbourhoods may face additional constraints on their chances for upward mobility. Comparisons between more and less strongly segregated communities should thus contribute to a more detailed understanding of variations in individual levels of social and economic advantage (Durlauf 2003, Durlauf / Young [eds.] 2001, Wilson 1987).

Another, closely related solution that emerges from recent debates on economic inequality is to use information on relevant spatial inequalities in the analysis of people's wellbeing opportunity. For instance, the previously cited literature on economic geography suggests that uneven levels of market integration and variations in the provision of key public services often lead to substantive differences in incomes and other relevant dimensions of wellbeing. These effects are often more important than those of climate or natural geography and they can be shown to persist, even when household specific determinants of wellbeing are taken into account (see for see for example Kanbur / Venables

2005, Jalan / Ravallion 2002, Escobal / Torero 2005). Relevant information that would allow identifying such spatial drivers of inequality is increasingly available in many low income countries and may be used to extend spatial comparisons of wellbeing, well beyond the level of detail provided by more conventional categorizations based on urban-rural strata, sub-national jurisdictions or aggregate geographic areas. Relevant examples include administrative data on local level of public goods provision or information on firm-level activity and infrastructure supply (see Chapters 2 and 3 below, as well as Zhang / Kanbur 2005, Christiaensen et al. 2005, Bedi et al. 2007).

The use of geographic instead of group-level data may also help overcome other problems often associated with the analysis and targeting of group inequalities. For example, in cases where information on group associations is not available or unreliable, but groups are highly segregated, location may serve as a useful proxy for group membership and inequalities may be identified by simply focusing on differences in living conditions between relevant areas (see for example Figueroa / Barron 2005, Brown / Stewart 2006: 11). Likewise, while interventions that are targeted directly at groups (such as affirmative action programmes or group-specific transfers) often tend to deepen group identities and stigmas (see above), spatially targeted interventions tend to have a less direct impact on social group relations. As such, the analysis of spatial inequalities may point to policies for the reduction of group inequalities that are less likely to reinforce group identities than more conventional policies towards group inequality (Stewart et al. 2009, see also Chapter 2).

Both of these ideas will inform the analysis of inequalities in wellbeing opportunities in the empirical case studies on social and spatial inequalities in Madagascar that are presented in the substantive chapters of this thesis. The following section will outline the country context and the major findings of this work.

1.5 Madagascar - Country context

Madagascar, the case study country chosen for this analysis, offers a good illustration for many of the conceptual arguments that motivate this thesis. Ranked as one of the poorest nations in the world by a number of measures such as per capita income, poverty, or the UNDPs Human Development Index, the island has been a 'hotspot' for international development efforts over much of the past decade (Stifel et al. 2008). The government of Madagascar itself initiated an ambitious development strategy, called the Madagascar Action Plan, which emphasizes improvements in a number of areas, such as schooling, transport, rural development, health and family planning and natural resource management. This programme was supported by a range of international sources, including the US Millennium Challenge Account,[42] the Education for All initiative, as well as sizeable programmes by multilateral and bilateral donors such as the World Bank, European Commission and the French and Japanese governments. At their recent peak, aid flows to the island amounted to over 12% of gross national income, or close to US$900 million in absolute terms. Following the national development priorities, most of this aid was allocated to improvements of living conditions in rural areas, education, health, as well as other social and humanitarian development objectives.[43]

Sadly, Madagascar also has a long history of political instability and many of the country's developmental efforts were either cut short by recurrent economic crises or did not muster the necessary longer-run political support to be sustained over time. For example, following ambitious programmes of school expansion and rural development after independence in the 1960s, most developmental efforts were reversed in the 1980s, after the country encountered a severe balance-of-payment crisis and harsh structural reforms were imposed by

---

[42] Madagascar was one of the first countries to qualify under this initiative. However the country programme was cancelled following the recent military coup described below.
[43] See OECD Development Co-operation Directorate Aid Statistics and Recipient Aid Charts. http://www.oecd.org/dataoecd/18/57/1901327.gif, last accessed September 5, 2010.

multilateral finance institutions. Growth recovered in the later years of the 1990s, coupled with an improvement in important dimensions, such as education and health (World Bank 2002). However, the recovery was again cut short by a political deadlock in 2001 / 2 when outgoing president Didier Ratsiraka refused to cede power to his elected successor Marc Ravalomanana (see Marcus 2004, as well as Andrianjafy et al. 2002 for the economic and social impacts of this crisis). While this power struggle was followed by another period of relatively robust growth, development efforts were again interrupted by a more recent violent coup, in which the Ravalomanana government was removed by a coalition of mutinous army forces and an opposition movement led by the capital's former mayor Andry Rajoelina (Ellis 2009). This crisis is still not resolved today and international concerns about the legitimacy of the Rajoelina government have halted most aid flows into the island.

While each of the previous crisis' has its own pedigree of causes, the instability of Madagascar is often attributed to two general factors (Ellis 2009). The first is the deeply engrained poverty, which creates competition for scarce economic resources and constitutes a permanent source of political unrest. While Madagascar remains relatively thinly populated, recent birth rates are among the highest in the world.[44] This puts strong pressure on natural resources in rural areas, which are already depleted after century-long practice of unsustainable slash and burn agriculture in most arable regions of the island.[45] According to the latest reliable estimates, almost three out of four persons in rural areas live in absolute poverty (73.5%) with particularly high incidences in the less developed south and southwest of the country. This is despite recent efforts to improve the living conditions of the rural population and represents a poverty incidence that is well above that of urban centres (52%, World Bank 2007: 3, Romani 2003).

---

[44] The population is estimated at close to 20 million in a country one and a half times the size of France. Estimated population growth in 2008 is 2.8% per year, well above the average for low-income countries (2.1%, see World Bank country development indicators. http://devdata.worldbank.org/AAG/mdg_aag.pdf, last accessed September 7th 2010.
[45] Agricultural productivity levels and fertilizer use are among the lowest in the world (see for example Minten / Barrett 2008).

Rural poverty contributes to political instability primarily through the inflow of unskilled and easily mobilized people into the urban centres. While most Malagasy are traditionally tied to their inherited family land by strong ancestral beliefs (see Chapter 2), urban labour markets regularly have to absorb large numbers of temporary male migrant workers who flock to the cities in search of jobs. Widespread dissatisfaction among the urban unemployed creates an explosive atmosphere in larger towns and especially in the capital Antananarivo, which remains the economic centre of the island. Over much of the post-independence period, political unrest among the urban poor has been regarded as an important factor behind earlier eruptions of conflict (Ellis 2009). It also explains the two recent transition of political power to Andry Rajoelina and his predecessor Ravalomanana, who were both carried to the presidency on the back of strong popular mass movements in the nation's capital.[46]

The second often noted factor behind the high level political instability is a historical cleavage between the economically and politically dominant group of Merina and other ethnic groups in the island (Ellis 2009, Marcus 2004, Marcus / Ratsimbaharison 2005). The Merina have dominated the political and economic landscape of the island for much of the past one and a half centuries, since the Merina empire began to expand its power base from its small central highland kingdom around the present day capital Antananarivo, to gradually conquer ethnic groups in almost all of the remaining regions of the island.[47] Today, the Merina still have higher levels of income and are better represented in the political and administrative institutions of the government than any other ethnic group. While these differences do not appear to be the result of outright political

---

[46] Ellis also attributes the high propensity for urban unrest to the fact that many of Antananarivo's urban poor are the descendants of slaves. While the institution of slavery was formally abolished under French colonial rule, many observers explain contemporary inequalities with the stigma of slavery (see for example Ellis 2009, Evers 2002).

[47] The rise of the Merina began under its king Andrianamponimera in the late 17th century. Subsequent rulers expanded the kingdom to create one of the largest and best-organized pre-colonial states in 19th century sub-Saharan Africa. Even though the Imerian monarchy had to cede power to French forces in 1896, descendents of the Merina continue to dominate the political and economic institutions of the island and most of the economic activity today takes place around the historical and present day capital Antananarivo (Stifel et al. 2008). The history of this expansion is discussed at more length in Chapter 2 of this thesis.

or economic discrimination, they do reflect historically uneven levels of education and superior geographic attributes of the highland region around the nation's capital that is predominantly inhabited by the Merina (Stifel et al. 2008).[48]

The strong inequalities between the Merina and other groups have often meant that ethnic divisions could be easily exploited for political purposes. For example, the political crisis in 2002 involved a long and bitter stand off between supporters and opponents of the incumbent president Didier Ratsiraka, who played on his own coastal origins to rally provincial authorities outside the capital against his competitor and subsequent successor Ravalomanana (Ravalomanana is of Merina origin from a small town near the capital). While ethnicity played no open role in the previous crisis (Andry Rajoelina is also of Merina origin), some observers have suggested that the search for political coalitions in the current period of political instability may again open up ethnic divides (Ellis 2009).

It has often been proposed that the more fundamental economic inequalities at the root of these political tensions should be mitigated by a substantive expansion of core public services such as education, transport, or basic utilities in the more disadvantaged rural areas of the island (see for example World Bank 2007, Stifel et al. 2008: 14). However, perhaps ironically, more widely studied breakdowns along urban-rural lines and between the Merina and other ethnic groups are probably not sufficiently disaggregated to efficiently target resources to the most vulnerable groups in the Malagasy society. The case studies presented in the following chapters identify two dimensions of social and spatial inequality that may be used for such targeting purposes. In line with the overall arguments of this thesis, these partitionings are particularly important in

---

[48] Stifel et al. find that the effect of ethnicity on household consumption disappears entirely, once they account for differences in education, gender, land holdings and remoteness. This indicates that the advantaged position of the Merina majority today is the result of this group's historically superior access to education and productive assets, but not of any residual discrimination in the current education system or labour market (Stifel et al. 2008: 8f).

dimensions more commonly associated with the principle of opportunity equality such as education, basic service supply and private wealth.

The first dimension of inequality discussed in this thesis concerns the aforementioned differences between Christians and 'traditional' believers in Madagascar. As in many other sub-Saharan countries, adherents of traditional religion, who practice an ancestral belief system, are among the poorest groups in Malagasy society (see Chapters 2 and 4). Moreover, for historical reasons non-Christians are primarily concentrated in more remote rural areas, away from the nation's capital. While this suggests that there is some overlap between religious inequalities and the more frequently analyzed divide between the Merina heartland and the remaining regions in the island, the partitioning along religious lines stands out in at least two important respects.

Table 1.1 Inequality decompositions by ethnic group, religion and location

	Income			Years of schooling (age 15-40)		
	Total inequality	Between group share	Within group share	Total inequality	Between group share	Within group share
Merina / Other	0.388	0.095	0.905	0.104	0.075	0.925
Traditional / Christian	0.388	0.065	0.935	0.105	0.153	0.847
Urban / Rural	0.388	0.134	0.866	0.103	0.087	0.913
Level of service supply	0.388	0.261	0.739	0.104	0.196	0.804

All estimates are based on the Theil mean log deviation with parameter 0. The measure is described at more length in Chapter 4. Source: Author's estimates, based on the 2001 national household survey for Madagascar.

The first is that inequalities between Christians and traditional believers are much stronger in the domain of education than that of income. For example, a simple comparison of inequality decompositions along religious and ethnic lines suggest that, while differences in consumption between Merina and other ethnic group account for a higher share of total income inequality (9.5 %) than differences between Christians and non-Christians (6.5 %), this relationship is

reversed when the analysis shifts to inequalities in educational outcomes (measured by the completed years of schooling among the population in the working age).[49] Here group differences in the religious breakdown account for over 15%, more than twice as a much as in the comparison along ethnic lines (7.5%, see Table 1.1).[50] Additional evidence from more recent rounds of survey data presented in Chapter 4 of this thesis demonstrate that differences between religious groups are also important in other dimensions of wellbeing, such as child health, usage of private utilities, and media access.

Contextual evidence and econometric analysis discussed in Chapter 2 suggest that a large part of these differences are explained by a high degree of segregation between religious groups, which overlaps with historical inequalities in school provision. In the context of Madagascar, where domestic migration is relatively low, the spatial organization of the major religious groups still reflects differences in the outreach of Christian missionaries who were active in Madagascar in the late 19th and early 20th centuries. Missionaries were also the first providers of formal schooling, enabling populations in regions with a stronger Christian presence to accumulate human capital relatively early on in the modern history of Madagascar. Because subsequent investments in the education sector never managed to establish complete primary and secondary school coverage, these inequalities in the early years of formal education provision are still reflected in very uneven rates of educational outcomes today.

---

[49] All of the inequality estimates presented here are based on the Theil mean log deviation (also known as the general entropy measure with parameter 0. See Chapter 4 for the underlying formula). All decompositions use nationally representative household survey data for the year 2001. The survey is described in Chapter 2. The age range in education is restricted to 15-40 years, to avoid bias due to higher inequality in education among the older population (see Sahn / Stifel 2003a for a similar definition of the working age in another paper on educational inequalities in sub-Saharan Africa). The results were robust to alternative definitions of the age range. Note also that a constant of 1 was added to years of schooling to deal with zero values that would have been omitted by the GE(0) measure. While this affects the estimate of absolute educational inequality it does not change the ranking of between group inequality shares across alternative group partitionings.

[50]Note that between group shares tend to be higher in education than in income across all of the breakdowns. This is due to the simple fact that there is less natural interpersonal variance in completed years of schooling than in income.

In addition, and partially explaining differences in interreligious inequalities in the dimensions of income and education, the divide along religious lines points to geographic inequalities in school outcomes that differ from more widely studied spatial and ethnic cleavages in the island. For example, while much of missionary activity in the 19th century was concentrated in the economically more advanced areas around today's capital Antananarivo, Christian missionaries also built up a strong presence in more remote regions in the southern highlands. These latter areas are among the poorest regions in the island today. However, the impact of historically higher levels of school supply in these areas is still reflected in levels of educational attainment that are well above the national average. These findings reverse some of the more established notions about spatial inequalities in the Malagasy context and may point to new priorities for the targeting of national educational policies (see Chapter 2).

The second aspect of inequality discussed in this thesis concerns spatial variations in wellbeing between areas that differ by their level of public service supply. Previous research has shown that, in addition to the generally advantaged position of the region around the nation's capital, considerable inequalities exist in the remaining parts of the island. For example most poverty assessments uncover strong differences in poverty rates between the less developed southern provinces Fianarantsoa and Tulear and the northern and eastern provinces Antsirananna and Toamasina (see for example Razafindravonona et al. 2001, Romani 2003).[51] However, even within these regions there are signs of substantive variations in wellbeing. A study by Mistiaen et al. (2001), which estimate household consumption aggregates on the basis of 1993 census data, demonstrates high levels of inequality within administrative provinces and even districts. The authors also identify high levels of inequality within municipalities,

---

[51] These latter regions produce most of the cash crops in the island such as vanilla, litchis or spices.

but these results are driven by a relatively small share of communes with an extremely skewed income distribution.[52]

Subsequent analysis suggests that these differences are related to variations in the level of remoteness and service provision among rural communities. For example Razafindravonona et al. 2001 and Stifel et al. 2003 show that municipal level poverty headcounts differ significantly along with a community's access to roads, health and education facilities, and agricultural extensions services (see also Stifel et al. 2008).[53]

This thesis expands on these findings by incorporating information on spatial variations in public goods provision directly in the organization of spatial comparisons of wellbeing. Chapter 3 draws on administrative data to classify municipalities by their level of access to key public utilities (water and electricity). This leads to a categorization of communities into four groups, which ranges from municipalities with no provision of public utilities, through rural areas with intermittent service supply to urban areas with full public goods provision.

Simple inequality decompositions along the lines described above illustrate the relative salience of this alternative breakdown (Table 1.1). While the larger number of categories in the partitioning by service access means that between-group shares of this classification are not directly comparable with the more conventional breakdown along urban-rural lines, the between-group share in the categorization by service supply is more than twice as high than in the urban / rural comparison, and higher than in any other partitioning presented here.

---

[52] The underlying method was developed for the construction of poverty maps and projects consumption aggregates from a sample household survey onto national census data. The procedure permits much more disaggregated poverty comparisons than standard survey based estimates. See Mistiaen et al. 2001.

[53] In particular in the west and south these factors are further expounded by high levels of insecurity. For example Fafchamps and Moser (2003) find a strong association between lack of road transport and incidences of insecurity which in turn correlates strongly with lower productivity and consumption levels.

Moreover, when this classification is combined with information on household's private asset wealth and housing quality, changes in the wellbeing ranking of geographic areas emerge that differ again from more established notions about spatial inequalities in Madagascar. For example, while municipalities in the wealthier north of the island appear to be consistently better off than communities in the less developed south when only differences in private wealth are considered, some reversals occur when differences in the provision of public goods supply are incorporated in the analysis. In some of the southern regions of the island communities that are poorer with respect to private wealth actually have higher levels of public goods provision than comparatively wealthier communities in some areas in the north. These changes in the relative ranking of communities again point to potentially new priorities for the targeting of poverty alleviation programmes, especially when these findings are compared to earlier results that rely only on more conventional spatial partitionings and monetary indicators of wellbeing.

1.6   A few notes on methodology

Before concluding this introduction it is helpful to point out a number of methodological choices that are reflected throughout the substantive chapters of this thesis. This is particularly important as the group-based approach followed here has similarities, but also relevant differences, with two other recent developments in the literature on poverty and inequality analysis. These are, respectively, the growing tendency to employ multidimensional measures in wellbeing analysis and a trend towards interdisciplinary research designs for poverty assessments.

The tendency towards multidimensional measures has close affinities with the egalitarian conception of opportunity equality described earlier in this chapter. As was seen above, many conceptual proposals put forward under this

framework, such as asset-based measures or the capability approach, are by nature multidimensional as they seek to determine individual levels of advantage on the basis of information on multiple endowments and functionings of the individual (Bourguignon 2006: 89).

When modelling individual opportunities in this context a question that has received much attention in the recent literature is how information on a person's multiple endowments and attributes should be summarized in synthetic indices that would permit making direct comparisons of individual levels of advantage. For example, faced with a range of indicators describing a person's various assets or abilities, all of which are potentially relevant for a person's opportunity in their own right, analysts usually face multiple questions, such as how much weight to assign to each asset or outcome in an aggregate index, or how to deal with possible interactions and complementarities between different wellbeing outcomes.[54] Over the past few years this has led to a lively debate on the appropriate aggregation and weighting procedures to be adopted for the construction of multidimensional indices of wellbeing (Bourguignon / Chakravarty 2003, Atkinson 2003, Decancq / Lugo 2008, Alkire / Foster 2008, see also Thorbecke 2007 and Bourguignon 2006 for overviews of this debate).

In practice, the debate on the appropriate aggregation procedure is far from settled, and some observers have suggested that it may be more fruitful to

---

[54] An often encountered question is whether outcomes in the multidimensional space should be considered as substitutes or whether they are complementary to each other. For example, it is often noted that a person's nutritional level will have effects on his or her performance in other dimensions such as education or income. This means that nutrition is complementary to other wellbeing outcomes and it may imply that outcomes in alternative dimensions should not be analyzed independently of a person's nutritional status. Recent proposals by Bourguignon and Chakravarty (2003) and Atkinson (2003) permit varying the degree of complementarity across dimensions in multidimensional comparisons of wellbeing. However, for practical and conceptual reasons it is typically only possible to model these interactions for a maximum of three or four dimensions at a time (Thorbecke 2007). Another problem that arises in the specific context of multidimensional poverty analysis is the difficulty of setting poverty lines in the multidimensional space. For example, while it is already difficult to determine how much education or health a person needs in order not to be counted as poor in either of these dimensions, it is even harder to decide in how many dimensions a person must be deprived to be considered multidimensionally poor (Thorbecke 2007, Alkire / Foster 2008).

compare outcomes independently, across different dimension.[55] These debates usually have added relevance when the analysis is carried out over groups, instead of individuals. For example, Grusky and Kanbur (2006) point out that comparisons across relatively few groups, rather than a much larger number of individuals, naturally reduce the complexity of information to be considered in the multidimensional space (it is easier to make sense of multidimensional outcomes across, say, five groups than across 5,000 individuals). In ideal cases this may enable analysts to bypass complex statistical procedures and to focus directly on group categories that summarize relevant combinations of deprivations in the multidimensional space.[56] In a similar vein, Stewart has argued that, especially within countries and at explorative stages of the analysis of group inequalities, it may be preferable to keep various dimensions separate, "because among the questions to be explored are whether consistency across dimensions is important for outcomes; and whether some dimensions are more important than others." (Stewart 2002: 12).

The preliminary evidence discussed in the previous section indicates that this reasoning also has strong relevance in the context of the empirical work presented in this thesis. The empirical case studies of interreligious and spatial inequalities in Chapters 2 through 4 document that historical and geographic differences in the provision of formal schooling and other basic services lead to considerable variations in individual wellbeing opportunities in a range of dimensions, such as education, asset wealth and health. The identification of

---

[55] See for example recent debates between Martin Ravallion and James Foster on a multidimensional index of deprivation that was proposed by Foster and Alkire (2008). Contributions by each author are accessible at http://blogs.worldbank.org/africacan/a-debate-on-multidimensional-poverty-indices and http://www.oxfamblogs.org/fp2p/?p=3092 (both links last accessed September 26th 2010).

[56] Grusky and Weeden (2006, 2007) extend this idea by proposing to employ latent class analysis to identify structural patterns in the distribution of outcomes and endowments in the multidimensional space. Resulting 'classes' may then be used to reduce the complexity of multidimensional wellbeing analysis to a smaller and more manageable number of inter-class comparisons (see also Grusky / Kanbur 2006:17). A similar logic underlies the sociological approach to the determination of relative poverty lines. At least since Townsend's seminal work on relative poverty in the UK, this literature usually identifies the poverty threshold on the basis of observed correlations between income and multiple non income related indicators of wellbeing (see for example Townsend 1979, Gordon et al. 2000).

these aggregate-level inequalities is directly relevant both for the targeting of welfare policies and to explain the persistence of more structural differences in living standards in the Malagasy context. At the same time, there are strong arguments to address these aggregate inequalities independently across dimensions. For example, both the finding that non-Christians in Madagascar are particularly disadvantaged in the domain of education and the fact that the wellbeing ranking of some areas in Madagascar differ across the dimensions of private wealth and public goods provision are of interest in their own right. But these findings would have been easily omitted by synthetic measures that combine various dimensions into single multidimensional indices of wellbeing.

Another reason to depart from the more established literature on multidimensional poverty and inequality measurement results from the context in which aggregate indices will be used here. In this thesis the need to aggregate information on multiple wellbeing indictors arises primarily in Chapter 4, where a multidimensional index is used in an attempt to operationalize Sen's capability approach. This proposal considers various functioning achievements at the group level to approximate the latent wellbeing capabilities of individuals within the same group (the actual capability score of an individual is constituted by his or her group's attainment on a multidimensional metric of group-level functionings).[57]

However, the focus in this proposal is on the notion of capability freedom, and in the literature such notions have often been treated in a way that assigns relatively little direct importance to the aggregation question. For example,

---

[57] The aggregation problem also arises in Chapter 3, where an asset index is presented that combines information on private wealth and public service supply. However, for the reasons just stated, that chapter argues that it is more appropriate to keep the dimensions of private wealth and service access separate. The chapter also follows the conventional approach in the literature on asset indices by aggregating information on individual assets and housing variables with the help of simple data reduction techniques (in this case principle component analysis). While the weights generated by this method have been criticized as arbitrary, the method does appear to be appropriate in so far as the information in question concerns indicator variables that do not describe outcomes that would be individually valuable (see for example Decancq / Lugo 2008:17).

according to a seminal paper by Pattanaik and Xu (1990), the level of wellbeing freedom is estimated simply by evaluating the number of alternatives in the opportunity set.[58] The aggregation of the choice set under this proposal thus follows a simple 'counting' procedure, where all elements are just added up with equal weights.[59]

Chapter 4 adopts this same logic and thus a person's capability set is estimated as the simple non-weighted sum of all observed outcomes of other group members in all relevant wellbeing dimensions considered in the analysis. However, the chapter notes that there is no need to restrict the analysis to this one aggregation procedure. In fact, different approaches could have been used to aggregate feasible wellbeing outcomes into a person's capability set, without loss of the basic intuition that individual wellbeing opportunities could be observed on the basis of group-level information. In this particular case, the choice of aggregation rule can therefore be subsumed under the proposed group-based approach to capability analysis. It is not a concern that directly determines the proposal's feasibility.[60]

The second area where the group-sensitive approach followed here overlaps with recent debates in the wellbeing literature concerns the integration of various methods and disciplinary perspectives in the design of research on poverty and inequality. For instance, starting with the rapid dissemination of participatory rural appraisal methods in the 1980s, there is now a growing tendency to combine conventional survey-based assessments of poverty with 'qualitative' approaches such as focus group discussions, institutional mapping exercises or ethnographic case studies (see Booth et al. 1998, Bamberger ed.

---

[58] Subsequent proposals also account for the quality or person-specific relevance of individual elements in the opportunity set. However, these proposals do not usually change the fundamental approach to the measurement of the idea of opportunity freedom (for an overview see Bavetta / Guala 2003).

[59] See also Alkire / Foster (2008) who propose a similar conception of wellbeing freedom in the context of multidimensional poverty analysis.

[60] Note however, that the choice of aggregation procedure may affect the ranking of different groups under the proposed framework.

2000 for overviews and examples of these 'mixed methods' poverty assessments). This trend towards mixed methods designs in poverty analysis has triggered a large methodological literature on the potentials and practical challenges of combining qualitative and quantitative approaches—a discussion often referred to as the 'Q^2 debate' (Kanbur [ed.] 2003; see also Carvalho / White 1997; Appleton / Booth 2001; Campbell / Holland [eds.] 2005).[61]

The group-based perspective proposed here has evident similarities with this literature, as it also incorporates perspectives and methods from a range of disciplines, such as economics, sociology, anthropology and geography.[62] However, there are important differences both with respect to the choice of methods and the level of social and spatial aggregation at which inequalities are being analyzed here.

In the Q^2 debate most of the qualitative approaches employed in the context of mixed methods poverty assessment tend to favour localized and often participatory formats of analysis. For instance, when participatory appraisal methods and ethnographic case studies entered into the mainstream of poverty analysis in the 1990s, the aim was often to increase the local legitimacy and relevance of existing poverty assessments that were based on national survey data. Qualitative research included in these assessments thus typically focused on local perceptions and experiences of poverty that were omitted under more conventional survey-based approaches, often relying on very contextualized, locality-specific ethnographic work and participatory methods (see for example

---

[61] See also two compendiums on this debate, published in *World Development,* Volume 30, issue 3 (March 2002) and Volume 35, issue 2 (February 2007). Another closely related literature discusses the question of interdisciplinary research in the fields of rural development and natural resource management. See for example Bardhan [ed.] 1989, as well as a special edition on economic and anthropological approaches to the study of common pool resource management institutions in the *Journal of Economic Development and Cultural Change,* Vol. 54, No. 3 (April 2006).

[62] For example, economic literature on spatial inequalities has evident similarities with assumptions and methods used by geographers, while the debate on social inequality, social exclusion and group-level interactions increasingly gives rise to collaborative efforts between economists, sociologists and anthropologists (see for example, Grusky / Kanbur 2006, Morgan et al. [eds.] 2006, Rao/ Walton [eds.] 2004).

Booth et al. 1998). However, these qualitative assessments typically did not aim to make or allow for making inferences beyond the immediate case study context (Shaffer 2003, Hentschel 1999, Kanbur 2003).[63]

In recent years there has been a growing concern that this strong dichotomy between very localized 'qualitative' research on the one hand, and 'quantitative' assessments of aggregate poverty trends on the other hand, may entail disagreements about local social realities and methods that are not always easily reconciled under the same analytical framework (Kanbur 2001, Shaffer 2003). For example, Kanbur and Shaffer (2007) note that, while participatory and ethnographic approach employed on the qualitative side of the spectrum are often embedded in a critical hermeneutic tradition, survey-based approaches are grounded in what the authors call 'positivist normative theory'. These two traditions take fundamentally different positions on important questions, such as the appropriate level of researcher involvement in the collection and interpretation of field data or the generalizability of findings on local manifestations of poverty. As a consequence, direct dialogue at a technical level is often hampered by more foundational disagreements about questions of epistemology and methodology.

The methodological choices in the following chapters place this thesis somewhere in the middle between these more established methodological dichotomies in the Q^2 debate. For instance, while very contextualized and participatory methods will often help to identify relevant group identities or sources of unfair social disadvantages (see for example Stewart 2002, Roemer 1998: 8),[64] such approaches are not used here, because they are generally less

---

[63] In the Q^2 literature this has often led to a situation where 'qualitative' research is seen to be almost synonymous with very context-specific, localized case studies and ethnographies, while quantitative instruments such as national sample surveys are associated with non-contextual formats of analysis that analyze poverty trends independent of local particularities or the case study context (see for example Hentschel 1999, Booth et al. 1998). Other distinctions focus more on the type of data collected (numerical or non-numerical) and the degree of population involvement in the analysis (participatory—non-participatory). See Kanbur 2003.

[64] Participatory assessments of group divides are particularly important in the context the analysis of group conflict. Here it is often the *perceived* similarity between group members, or the

suited for the type of interpersonal comparisons required under the egalitarian conception of opportunity equality adopted here. Different individuals and communities employ different conceptions of what constitutes a good life, and the results from such exercises may be less reliable in determining actual variations in local needs that would justify interventions under a possible redistributive policy framework.[65] This thesis will therefore assess variations in advantage on the basis of indicators that can be defined in more 'objective' terms, such as variations in the ability to satisfy basic needs for education, housing or health.

Another difference arises from the way contextual evidence is used here. In the empirical cases studies in this thesis, contextual information usually enters the analysis at higher levels of aggregation, to identify more general political and historical contexts that explain the social or economic standing of specific groups. For example Chapter 2 sets out from a careful contextual analysis of the history of missionary involvement and the education sector in Madagascar. This information is then used to identify new spatial patterns in the distribution of educational outcomes in the island and to distinguish between rival hypotheses that would each explain differences in education demand and school attainment observed across the major religious groups in the island. 'Contextual' information in this case explicitly refers to historical and geographic processes that operate at the national level, and this information is subsequently incorporated into the econometric analysis of national census and survey data (through the collection of appropriate historical statistics). The notion of contextual analysis employed in this case study therefore more closely resembles qualitative and comparative traditions adopted in other fields of the social

---

perceived extent of group inequality that determines whether group-relations turn violent (Stewart 2002, Langer and Ukiwo 2008).

[65] More specifically, these observations relate to the well known adaptive preferences problem (see Chapter 4) and the fact that different communities will often concentrate on different dimensions and indictors to describe their living standards (see Shaffer 2003). For example, the descriptions of village-level realities produced by participatory community ranking exercises often differ from alternative, survey-based procedures, both with respect to the dimensions employed to describe experiences of poverty and the reference levels used to determine which community members are poor (see Shaffer 2003).

sciences, such as political science, sociology or historical studies (see for example Tarrow 1995, Savage 1997). But it has fewer affinities with the detailed and highly localized ethnographic and case study approaches that have so far dominated the 'qualitative' end of the methods spectrum in the Q^2 debate.

Neither of these methodological choices exhausts the methodological possibilities of studying opportunity inequality and they leave a number of questions unanswered. For instance, policies designed to address the described inequalities in educational outcomes between Christians and traditional believers would almost certainly require additional in-depth analysis of local institutions and community-level dynamics to determine through what channels educational outcomes could be most effectively improved in the most disadvantaged areas of the island. Likewise, further detailed investigations at the local level may uncover new, and fine-grained cleavages at the spatial and group level, that are not captured by the case studies presented here.

At the same time, the group-based perspective adopted here does uncover important determinants of inequalities in wellbeing opportunities that were omitted by more conventional survey-based assessments of wellbeing heterogeneity in Madagascar. Moreover, because these findings can be directly linked to existing poverty estimates and targeting strategies in the island, they avoid some of the disputes about local validity that often divide qualitative and quantitative researchers in the Q^2 debate. As such, the group-based approach proposed here may offer an alternative perspective on the integration of research methods that would be more conducive to interdisciplinary collaboration than some of the mixed methods designs that have dominated the literature to this point.

2 Missionaries and schooling: historical origins of educational inequality in Madagascar

2.1 Introduction

The provision of universal primary education features centrally among international development priorities for sub-Saharan Africa (see for example United Nations 2009, World Bank 2008). Yet, despite a recent increase in absolute enrolments in the continent, major challenges need to be addressed before full primary school coverage will be attained. In particular, rural regions in sub-Saharan Africa continue to lag behind urban areas, both in terms of primary school supply and educational outcomes. Moreover, there are typically strong shortfalls in educational attainment among the poorer income groups in African societies (United Nations 2009, World Bank 2008a, African Development Bank 2002, Sahn / Stifel 2003).

A dimension of educational inequality that has received limited attention in the literature on sub-Saharan Africa is differences in school achievement between religious groups. For example, Canagarajah / Coulombe (1997) and Glewe and Jacoby (1994) find that practitioners of 'traditional' animist religion in Ghana have lower school enrolment rates than Christians and Muslims, controlling for other relevant school and household characteristics. Likewise, Bommier and Lambert (2000) find that Muslim children in Tanzania enrol later and spend fewer years in primary schools than Catholics or Protestants, again controlling for other household and school characteristics. However, all of these studies only use religion to control for unobserved household effects when studying other determinants of educational outcomes, and therefore do not provide any information that would explain these differences between religious groups.

This chapter aims to address this gap with an in-depth analysis of the causes of inequalities between Christians and traditional believers in Madagascar. Examining school enrolment rates from two distinct data sets, I find that children growing up in families that practice traditional, ancestral beliefs are considerably less likely to attend primary schools than children of Catholics and Protestants. These inequalities are accompanied by important differences in living conditions between Christians and non-Christians, with the latter group accounting for a disproportionate share of households in the lowest expenditure quantiles and a larger proportion of individuals living in the poorer and remoter communities of the island.

The explanation for these inequalities offered in this chapter differs somewhat from more conventional theories about the relationship between religion and educational achievement. While earlier literature has often followed a Weberian perspective, explaining educational inequalities between religious groups on the basis of group-specific variations in fundamental preferences for education (see for example Lehrer 1999, Chiswick 1988), this chapter argues that present-day inequalities between Christians and traditional believers in Madagascar primarily have historical and geographic origins: in Madagascar, Christian missionaries were the only provider of formal education for much of the 19th century. This overlap between Christianization campaigns and early school provision has given areas with a larger proportion of Christians a head-start with respect to the supply of school infrastructures and the accumulation of human capital. Because subsequent investments in the public school network were never sufficient to ensure full coverage of the education system, these imbalances persisted over time and are still reflected in the observed differences between religious groups today.

Evidence in support of this hypothesis is presented at both geographic and household levels. At the geographic level I demonstrate that the historical presence of missionary staff and Christians in an area still has a significant effect on contemporary primary school enrolment and graduation rates in rural

municipalities. This relationship is robust to the inclusion of controls on geographic attributes and school supply, as well as—in the case of primary enrolment rates—to a test for endogeneity bias that uses a municipality's distance to the capital as an instrument to account for possible unobserved cultural factors that could explain both the stronger presence of Christians and better educational outcomes in an area.

Analysis at the household level suggests that these geographic imbalances affect individual educational outcomes, even when a person's own religious status is taken into account. For example, evidence from older age cohorts demonstrates that individuals born in predominantly Christian areas have consistently higher educational achievements than populations in areas with a majority of non-Christians, independent of the respondent's religious status or parent's educational background. Likewise, in the most recent school age cohort for which data are available, differences in school attendance between Christians and traditional believers appear to be primarily driven by uneven enrolments in private schools. However private schools—which are often operated by religious providers—are mostly concentrated in areas with a larger proportion of Christian households. When this difference in the availability of extra private schooling is discounted, the enrolment gap between religious groups disappears. Both of these findings point to more complex interactions between geography, religion and educational outcomes than would emerge under the alternative Weberian hypothesis that only explains differences in educational achievements on the basis of religiously-determined preferences for schooling.

The findings presented here have clear practical implications. Even though educational inequalities along religious lines were previously not of concern to policy makers and analysts in Madagascar, the magnitude of the educational shortfall among traditional believers, and the size of the population affected, indicate that attempts to attain universal primary education are unlikely to succeed unless the enrolment gap between religious groups is closed. While these equalizing interventions would be costly—possibly requiring large scale

investments in school coverage and targeted incentive based programmes to encourage school attendance of more disadvantaged children[66]—the strong geographic dimension that appears to underpin the observed interreligious inequalities holds some positive news for policy makers charged with the design of such programmes. First of all, spatial inequalities of the type observed in the case of Madagascar are much easier to address than the cultural biases and beliefs emphasized by the conventional Weberian interpretation. Moreover, interventions targeted at the spatial-level rather than directly to the non-Christian population are less likely to generate the type of social stigmatization and identity politics that are often associated with group-target benefits and affirmative action programmes (see for example Stewart et al. 2009).

The next section outlines the theoretical assumptions underpinning this chapter and reviews theoretical and empirical evidence on the relationship between religion and educational inequalities. This is followed by a description of the history of missionary activity and the education sector in Madagascar. Section 2.4 discusses my reasons to treat missionary activity as an exogenous cause of contemporary educational inequalities that is unrelated to other cultural or geographic influences. Section 2.5 describes basic characteristics of the non-Christian population. Sections 2.6 and 2.7 document the described historical inequalities in the education system using aggregate municipal level statistics and national household survey data. Section 2.8 discusses specifically the contribution of private schooling to current educational inequalities. The last section concludes and discusses at more length the policy implications of the findings of this chapter.

---

[66] Such as conditional cash transfers.

2.2   Theoretical argument

Ever since Max Weber's classic hypothesis of a Protestant ethic, researchers have tried to establish causal relationships between the social and economic outcomes of certain groups or societies and the value systems established by their respective religions. The field of education is no exception. At the cross-national level, La Porta et al. (1997) argue that societies that are dominated by religions with a more 'hierarchical' belief system tend to have lower high school completion rates. Similarly, several studies have explained persistent educational inequalities between Catholics, Protestants, Jews and various evangelical groups in the US by pointing to fundamental differences in the value and belief systems associated with these religions (see for example Chiswick 1988, 1986, Lehrer 1999, 2004).

The most common framework to analyze these relationships between religion and educational outcomes is provided by human capital theory (Becker 1967 and Becker / Chiswick 1966). Human capital theory assumes that parents make decisions about the investments in the education of their children, taking into account supply side constraints, such as school quality and accessibility or the direct and indirect costs of schooling, as well as household characteristics which may influence individual demand functions, like income or the educational background of the parents. School choices are then determined by the intersection of the supply and demand curves for each household, the point that maximizes utility for each parent.

Religion, if it is included, typically enters these models as a 'cultural' influence that affects school choices from the demand side. Broadly following Weber's initial hypothesis of a Protestant ethic, it has been argued that parents adhering to more 'modern' religions have a preference structure that is more conducive to schooling than that of individuals who practice more 'traditional' or 'anti-modern' beliefs. This difference in underlying preferences for education

78

would then result in much higher levels of school demand in the former group at any given level of school supply. For example, Lehrer (1999) has used such a line of argument to explain why fundamentalist Protestants in the US attain on average fewer years of formal education than Catholics or mainstream Protestants, her main hypothesis being that fundamentalist beliefs of the former groups are more likely to collide with "modern" attitudes and lifestyles embodied in the formal educational system.

However, this 'cultural' argument has been questioned by alternative interpretations of the human capital model. In a recent study that is very similar to the analysis proposed here, Becker and Woessman (2009) posit that consistently higher levels of economic performance among Protestants in 19th century Prussia cannot be explained by a stronger Protestant work ethos (as famously claimed by Weber) but by consistently higher rates of human capital accumulation among this group.[67] According to the authors, Luther's insistence that every individual should be educated to read the gospel led to an 'education supply shock' as reformist areas began to provide universal primary education for their local populations. The ensuing rise in literacy rates then had a positive effect on economic growth in predominantly Protestant areas.[68] The authors note that, while this explanation is somewhat complementary to the traditional 'Weberian' interpretation of the human capital model—in the sense that formal schooling and resulting accumulation of human capital may have encouraged the spread of 'modern' attitudes in predominantly Protestant areas—the underlying causal channel leading to higher rates of economic development is different. Variations

---

[67] Similar links between historical events and human capital accumulation have been used to explain consistently higher educational outcomes among Jews. For instance, Botticini and Eckstein (2005) argue that increasing selection of Jewish individuals into urban high skilled professions was triggered by religious reforms in the first millennium which emphasized education. Likewise, the so called 'Diaspora' hypothesis proposes that Jews consistently invest more in human capital as the repeated experience of prosecution has led to a strong preference for investments in portable and transferable human capital among this group (see for example Brenner and Kiefer, 1981).

[68] The authors support this claim with the help of 19th century census data, which shows that Protestant counties had much higher rates of literacy and economic prosperity throughout much of the 19th century. The resulting effect is robust when Protestantism is instrumented by a county's distance to Wittenberg. Becker and Woessmann also demonstrate a similarly robust effect of Protestantism on historical female enrolment rates (see Becker / Woessmann 2008).

in economic outcomes are the result of historical differences in school supply, stemming from the choices of local rulers during the Reformation in the sixteenth and early seventeenth centuries. The emergence of a particular work ethic in Protestant regions may be a byproduct of these historical processes, but it does not explain it (Becker / Woessman 2009: 534).[69]

A similar historical process may well explain the high degree of inequality in educational outcomes observed between Christians and non-Christians in many developing countries today. It is well documented that the spread of formal education in the 19th and 20th century in several parts of sub-Saharan Africa was directly influenced by the work of missionary groups who were often the sole providers of formal education (Parker 1938, Woodberry 2004, Bolt / Bezemer 2009, Koerner 1999). It is equally well known that in many sub-Saharan African countries investments in the public infrastructure system were often insufficient to achieve full primary education coverage (see for example Collier / Gunning 1999, Sahn / Stifel 2003). In this context, it is not unreasonable to assume that strong educational inequalities along religious lines observed in many sub-Saharan societies today reflect longer-run differences in education supply and human capital accumulation that were created during the heyday of missionary campaigns in the 19th and 20th century.[70]

The following paragraphs outline the historical context of Christianization and formal school provision in Madagascar that lead me to argue that this link

---

[69] See Glaeser et al. (2004) for similar arguments about the role of human capital accumulation in the debate on institutional performance.

[70] A related explanation that is also not directly compatible with the 'religious preference' hypothesis involves variations in the supply of schooling to different groups. It is now well established that religious providers in many countries offer better quality education than their public sector counterparts (Altonji et al. 2005, Neal 1997, Sander 1996, Evans / Schwab 1995). This difference in school supply and quality may change the incentive structure of members of relevant religious groups and contribute to lasting divergence in educational outcomes across religious lines. For example, in the US, several studies have demonstrated that Roman Catholics indeed have a higher propensity to attend the better performing private schools operated by their church (see for example Neal 1997, Evans / Schwab 1995). These students then tend to outperform their peers from lower quality public schools, with the expected effect on inter-communal and interreligious inequalities in social and economic outcomes (see for example Coleman et al. 1987). I demonstrate below that religious private school provision may have had a similar effect on higher enrolments among Christians in Madagascar.

from historical missionary activity to current educational outcomes also applies in my case study. Subsequent sections of the chapter then demonstrate how the postulated relationships can be traced in contemporary data at both geographic and household levels.

2.3   Historical and country context

The expansion of Christian missionary activity in Madagascar cannot be discussed independently of the rise of the pre-colonial empire of the Merina in the early 19th century. The Merina emerged from relative obscurity under their ruler Andrianampoinimerina (1787 to 1810) who united isolated Imerina fiefdoms in the immediate vicinity of today's capital Antananarivo.[71] Andrianampoinimerina then expanded his rule beyond the Imerina heartland into the southern highlands, subduing by force or diplomacy other kingdoms and ethnic groups in the area.[72] The Merina then gained supremacy over almost all of the island under Andrianampoinimerina's son and heir Radama I (1810-1828) and his wife Queen Ranalovana I (1828-1861). The only areas never under Merina control were the relatively sparsely populated regions in the semi-arid south and extreme west of the island (see Map Panel 2.1).

Missionaries played a strong role in expanding the Merina empire, as they provided many administrative and technical innovations that helped to strengthen Merina supremacy in the island. The first missionaries from the London Missionary Society (LSMS) were invited by the recently convert King Radama I to baptize and educate the ruling elite in today's capital Antananarivo (Raison-Jourde 1991, 1983). Missionaries subsequently engaged in a series of innovations and reforms including the introduction of artisanal crafts, the development of written Malagasy and the codification of Merina laws (Heseltine 1971: 105, see below).

---

[71] The term 'Imerina' refers to the highland region initially inhabited by the Merina.
[72] The most important ethnic groups in these areas are the Bara and Betsileo.

Map Panel 2.1. Expansion of the Merina Empire 1750-1861

Madagascar
(around 1750)

Quasi deserted zones

---- Frontiers of main kingdoms

Imerina empire around 1757
Imerina empire around 1810
Imerina empire around 1861
Independent people
Boundaries of French protectorate
Migratory movements

Madagascar
(1757-1861)
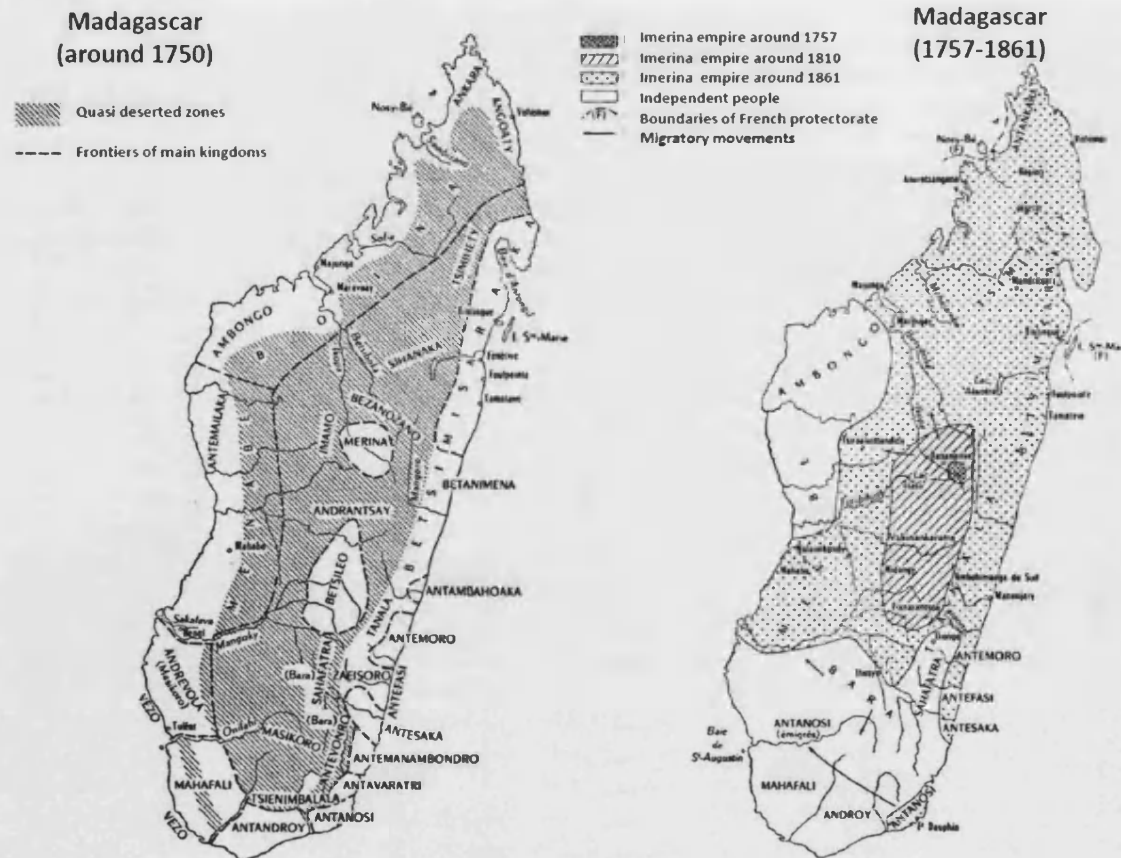
Source: Dechamps 1960: 98, 157.

With the exception of the reign of Queen Ranavalona I, who expelled missionaries from the island and prosecuted recent converts, the influence of missionary groups then expanded beyond the capital, often on behest of subsequent Merina rulers, who considered Christianization campaigns and the installation of missionary outposts as an additional means to cement their power in recently subjugated highland and coastal regions of the island (Raison-Jourde 1991, see also below).

In the late 19th century, at the arrival of French colonial forces, the LSMS alone reported over 1,000 churches in regular operation (Koerner 1999:38). Other churches involved in missionary activity included the Quakers and Norwegian Lutheran church. Moreover, towards the end of the 19th century, French Catholic missionaries engaged in a competition with Lutheran and Protestant churches over the number of Malagasy baptized. Under French colonial rule Catholics then replaced the Anglican Church and other reformist groups as the most important Christian denomination in Madagascar.[73]

2.3.1 Religious schooling

The work of the early missionaries is closely related to today's education system because Christian churches were also instrumental in establishing the foundations of modern schooling in the island. The first school in Madagascar was opened in 1820 in Antananarivo by Anglican missionaries of the LSMS. Missionary groups then remained the exclusive provider of education for almost another 100 years. By 1880 the LSMS alone operated more than 860 schools in and round the capital, although most were staffed by poorly trained local teachers. Quakers and Norwegian missionaries collaborated closely with the LSMS, thus ensuring that most schools in the island at the time were affiliated

---

[73] A legacy of this competition is that most villages in the central highland today have Protestant and Catholic churches at opposing ends of the town square. However, contemporary relations between the two churches are much less conflict-laden and both churches collaborate closely in the Malagasy Confederation of Churches (FJKM).

with the Anglican or Protestant confession (Koerner 1999, 34ff, 61ff). However, towards the end of the 19th century and in the first years of the 20th century, the growing presence of French Catholic missionaries also shifted the balance of the religious schooling system. Between 1881 and 1882 the number of students in Catholic missionary schools almost doubled, reaching 23,600 in 1893 (Koerner 1999:75). Following the imposition of colonial rule by the French in 1896, the Catholic Church replaced Anglicans and Lutherans as the most important provider of schooling in the island.[74]

Current imbalances in the supply of primary education can be traced back to these early phases of the schooling system in Madagascar. Maps of missionary activity of the major Anglican and Protestant churches in the late 19th (Maps 2.2. and 2.3) demonstrate that missionary efforts were mostly concentrated in the central and southern highland regions of the island. For instance, even after its initial rapid expansion, most of the school network of the LSMS never extended far beyond the central highland regions around Antananarivo and the city of Fianarantsoa, the capital of the southern highland province of the same name.

Likewise, after initial attempts to establish missionary outposts in the east and west coast of the island, French Catholic missionaries began to focus on the reconversion of previously baptized Anglican and Lutherans. As a consequence, Catholic schools were primarily concentrated in areas that were already covered by other missions. At the end of the 19th century most religious schools were thus equally located in the central and southern highlands of the country (Koerner 1999:38).[75]

---

[74] Catholic missionary activities were interrupted in 1885 after the first French-Malagasy war, and both Protestant and Catholic missionaries suffered serious reprisals by Malagasy uprisings immediately after French occupation in 1896. However the number of missionary outposts and school stabilized quickly after each respective crisis (Koerner 1999).

[75] Other missionaries such as the Norwegian Lutherans also focussed their efforts on these areas, albeit some schools were operated around what is now the south-eastern coastal port of Tulear and east coast port of Farafangana.

Map 2.2. Mission map of Madagascar (ca. 1875)

Anglican
Quaker
Norwegian

Source: Koerner 1999:37.

Map 2.3. Missionary map of Madagascar (ca. 1890)
(Darker areas indicate lower levels of missionary activity)

Source: Middleton [ed.] 1999: 100.

2.3.2 History of the public education system

Non-religious public primary schools were only introduced at the beginning of the 20th century under French colonial rule, making public schooling a fairly recent feature of the national education system. Having initially relied on Catholic French missionaries to provide education to the Malagasy population, the colonial administration introduced public schools to counterbalance the perceived dominance of the Church in the formulation and implementation of the school curriculum.[76] Schools were organized at three levels: country or primary schools with a curriculum combining basic education and manual labour/training, secondary schools which focused on vocational training, and higher-level schools to educate administrators and technicians for the French colonial administration (Koerner 1999: 128). Public primary schools of the type known today were only introduced after independence in the 1960s as a part of the newly independent government's campaign for universal education coverage (see below).

While the network of country and primary schools aimed to rectify inequalities created during the time of missionary school provision, this reform did not manage to significantly impact the more remote regions of rural Madagascar.[77] Deschamps (1960: 309) reports that by 1953 literacy rates among the major ethnic groups outside the Imerina heartland fluctuated between 22% to as little as 1.6% in the extreme south of the island. Moreover, approximately 45% of total enrolments at the time were still accounted for by Catholic and other religious schools (Deschamps 1960: 308, Koerner 1999: 244).

The first systemic effort to establish universal primary school coverage in Madagascar was limited to a relatively short time window of only 20 years after the country gained political independence in 1960. A cornerstone of the education

---

[76] This policy was accompanied by a withdrawal of public subsidies for most religious schools, leading to a temporal decline in the number of students educated by missionary groups (cf. Koerner 1999: 143ff, Heseltine 1971: 148f).

[77] Among others, the colonial school network prioritised areas in the south and north of the island that had not previously benefited from missionary schools (Koerner 1999).

policy of the newly independent republic was to ensure that each of the 11,000 Fokontany of the island (the smallest administrative unit covering individual villages or neighbourhoods) should have at least one public primary school. As a result, the number of students enrolled in primary schools almost doubled between the early 1960s and 1975; a growth rate that placed Madagascar among the best performers in the developing world at the time (World Bank 2002: 12f, Koerner 1999: 270ff). These improvements in school coverage were particularly marked in the western and southern provinces of Mahajunga and Tulear, thus rectifying some inequalities in school supply inherited from the colonial period (Koerner 1999: 271).

However, this policy of education expansion did not prove to be sustainable when Madagascar encountered economic difficulties in the early 1980s. Between 1970 and 1999 per capita GDP fell from US $473 to $227, a reduction of over 50% and well above the falls in income experienced by other sub-Saharan countries at the time (World Bank 2002: 3, figures reported in 1997 prices). In this setting, both public spending and the demand for education dropped dramatically. In the early 1990s, following the imposition of strict fiscal austerity by international finance institutions and an increase in the service of government debt, education spending contracted from 3.2% of GDP in 1991 to 1.8% of GDP in 1995. Public education expenditure only returned to its initial level in 2000 (3.1% of GDP, World Bank 2002:6).

These cuts in education spending reversed many of the improvements in school coverage achieved during the previous two decades. By the early 1990s, primary schools, particularly in remote rural areas, were closing at a rate of over 1,700 facilities per year and teaching conditions in those that remained open worsened (in some schools student-teacher ratios reached over 200 student per teacher (Koerner 1999: 288f).[78] Moreover, enrolment and school administrative data from the late 1990s suggests that school closures had a disproportionate

---

[78] During the same time period gross enrolment rates in primary education fell by over 16% (Koerner 1999).

effect on regions that were already disadvantaged before the crisis. For example, according to a World Bank review of the education system in the 1990s the provinces of Tulear and Mahajunga and parts of the province of Fianarantsoa, which had historically lower levels of school supply, also had the lowest primary enrolment rates and the highest share of closed schools in the country (World Bank 2002: 48, 59).

2.3.3   *The current education system*

Current educational policies target a return to universal primary education. As in many other low income countries, primary education features as a priority in almost all of the recent poverty alleviation policies of the Government of Madagascar. Donors have pledged to support this effort through a number of large-scale interventions, such as through the Education For All initiative and several rounds of multi-donor budget support programmes (see for example World Bank 2008b).

Despite these efforts inequalities in primary school coverage are still severe. Recent estimates indicate that net primary enrolment rates in the poorest consumption quintile are still considerably lower than in the richest quintile (70.8% compared to 99.1%, respectively), with an increasing gap in higher levels of education. This is accompanied by a persistent shortfall in primary enrolment rates in remote rural areas as well as by significant inequalities between different provinces of the island (World Bank 2008).

Moreover, the quality of education offered by the public school system is exceptionally low. Primary schools are typically overcrowded and average repetition rates in the primary cycle are among the highest in the world (about one third of the primary student population repeats each year, World Bank 2002: 18). This shortcoming is compounded by teacher shortages and the fact that not all primary schools offer the full primary cycle. This forces students to drop out

of school before they graduate and cuts off any possibility to pass into secondary and higher levels of education.[79] Therefore, while gross primary school intake is still relatively high (97%), few students remain in school long enough to gain acceptable levels of basic education. Only an estimated 58% of each age cohort currently pass through the full primary cycle, and only a little over a quarter of children are ever enrolled in lower secondary schools.[80]

In addition, two features of the education system may contribute to today's inequalities between Christian and non-Christian populations. The first is the relatively high level of school fees, collected by primary schools to overcome shortfalls of teachers and other vital school equipment (these fees are collected and administered by local parent-teacher associations, created after the crisis in the 1990s). Previous research has established that these fees act as a strong deterrent of enrolment, especially among the poorer rural population (Glick / Sahn 2006, Fafchamps / Minten 2007).[81] It is likely that similar variations in the ability of different groups to afford school fees also contribute to the enrolment gap among non-Christians, as the latter group tends be poorer and more concentrated in remoter communities (see below).

The second factor is the increasing role played by private and religious school providers, which after the crisis increasingly began to substitute for shortfalls in the supply of public schools. In 1998 a quarter of all primary schools in the country were privately operated, enrolling over a fifth of the entire student population.[82] According to a recent estimate by the World Bank, close to 50% of all private schools were run by religious providers and another two-thirds of these

---

[79] The last systematic review of the education sector found that less than 70% of all primary schools offered the full primary cycle. The average school life expectancy for students was 3.5.years, well below the five years required to graduate from primary schools (World Bank 2002).
[80] World Bank, Education at a Glance: Madagascar. URL http://siteresources.worldbank.org/INTMADAGASCAR/Resources/MADA-Educ_at_a_Glance.pdf. Accessed 27.11.2008.
[81] Fees were briefly suspended in 2002.
[82] In Africa this share of private education was only topped by Cameroonand Togo at the time (World Bank 2002: 12).

schools were accounted for by organizations affiliated with the Catholic Church (with the remaining share operated by Lutheran and Anglican churches as well as other Christian confessions, see World Bank 2002: 11f, FN3).

While faith-based schools in Madagascar operate under the general public school curriculum and are formally required to take in students of all religious backgrounds, it is possible that this increasing role of religious providers indirectly contributes to differences in enrolments between Christians and non-Christians by offering costlier and higher quality education. Moreover, there are strong indications that private providers contribute to existing inequalities in school supply by placing their schools primarily in areas that are dominated by Christians. Evidence in support of these arguments are presented in the final section of this chapter.

2.4   Was missionary activity an exogenous shock?

A central assumption underlying the argument of this chapter is that Christianization campaigns and religious schooling in the pre-colonial and colonial era represented an exogenous shock that was unrelated to other local influences that could explain contemporary inequalities in educational and economic inequalities in their own right. An immediate objection to this assumption arises from the strong link between missionary involvement in the 19th century and the parallel expansion of the Merina empire. For instance, do higher levels of educational achievement in areas with a stronger historical presence of missionaries just reflect better socio-economic outcomes associated with economic and political reforms introduced under Merina rule? Likewise, does the concentration of missionaries of different confessions in the relatively temperate highlands (rather than the tropical coastal areas) mean that the presence of Christian missionaries is just a by-product of other geographic and climatic

characteristics that would explain higher levels of socio-economic development in their own right?[83]

In practice, it is very difficult to disentangle in retrospect the separate impacts of missionary activity, Merina rule and geography (and this is not helped by the scarcity of historical data for Madagascar). However, there are relatively strong contextual indications suggesting that missionary activity was indeed a sufficiently independent factor in Madagascar's recent history to justify treating it as a self-standing determinant of contemporary educational outcomes.

The first argument arises from the historical 'sequencing' of the activity of Christian missionaries in the context of the expansion of Merina rule. While the Merina are credited with important innovations in the late 18th and early 19th century—important examples include a new system of village administration and the introduction of irrigated paddy cultivation to replace inferior slash and burn agriculture (Allen 1995: 15f)—the expansion of the empire preceded the arrival of missionaries by little over 20 years. This is hardly sufficient time to establish the foundation for a flourishing political or economic system that would in itself explain persistently higher demand for modern education in this region.[84]

Moreover, once Christian missionaries had established themselves in the island they were quite instrumental for many administrative and technological reforms that were subsequently introduced under Merina rule. For example, Anglican missionaries were responsible for the codification of laws and the written Malagasy language, and they introduced important technical innovations such as new construction methods (based on burned clay bricks) or the creation

---

[83] For instance, it is telling that Christian missionaries of different confessions preferred to place their outposts in the more temperate and less disease-prone regions of the central highlands, rather than in the disease-prone tropical coastal areas or the arid south. Historical accounts point to extremely high rates of mortality among early missionaries in the coastal regions, which made it harder to create and maintain outposts in these areas. This suggests that climate played a direct role in the placement and survival of missionary outposts (see for example Heseltine 1971: 103f).
[84] Moreover, many of these innovations were initially limited to the immediate vicinity of today's capital Antananarivo (see Allen 1995: 15f).

and training of artisanal guilds, including printers, stone cutters, tin-smiths, sawyers and tanners (see for example Heseltine 1971: 105).[85] Since Christian missionaries were also responsible for the dissemination of these reforms in the Malagasy territory it can be expected that it is the historical Christian presence in an area that explains variations in socio-economic outcomes, rather than just the fact of Merina rule (Heseltine 1971, Allen 1995).

The second perhaps more important argument is that once one moves away from the field of education, there are actually few signs of a consistent relationship between Merina rule, the presence of missionaries and current and historical levels of socio-economic development. While the Imerina heartland around today's capital Antananarivo represents the historical and contemporary centre of economic and political activity in Madagascar, in particular the predominantly Christian regions in the southern highlands are historically much more marginalized. For instance, most historical accounts from the heyday of missionary activity agree that the southern highlands were among the least populated areas in the island (see also Map panel 2.1 above). These regions were also economically less advanced than more densely populated regions in the coastal areas, where inhabitants already engaged in profitable trade with French and English colonial powers on the neighbouring islands of Mauritius and Reunion. In the words of Hubert Deschamps, one of the most important chroniclers of Malagasy history, the southern highland at the time were 'half empty', while some of the tribes that inhabit these regions are depicted in even less favourably terms as 'half savage' (Deschamps 1960: 123). According to this author, the Imerina's motivation to conquer these regions was primarily grounded in a cultural affinity between the Merina and the southern highland people, but not by any favourable geographic or economic attributes of these areas (see below).

---

[85] Other techniques used by the Imerina, such as the use of iron tools for weaponry, probably did not emerge independently in the central highlands and were copied from other ethnic groups in the southeast of the island (Allen 1995:15f).

Map Panel 2.4 Contemporary enrolments and poverty levels

Enrolment rates 2001

District level poverty incidence (1993)

Antananarivo

**Primary enrolments
per population**

< 0.08
< 0.095
< 0.1
< 0.11
< 0.13
< 0.14
< 0.15
< 0.17

Poverty incidence

< 40%

40-60%

60-75%

75-85%

> 85%

No data
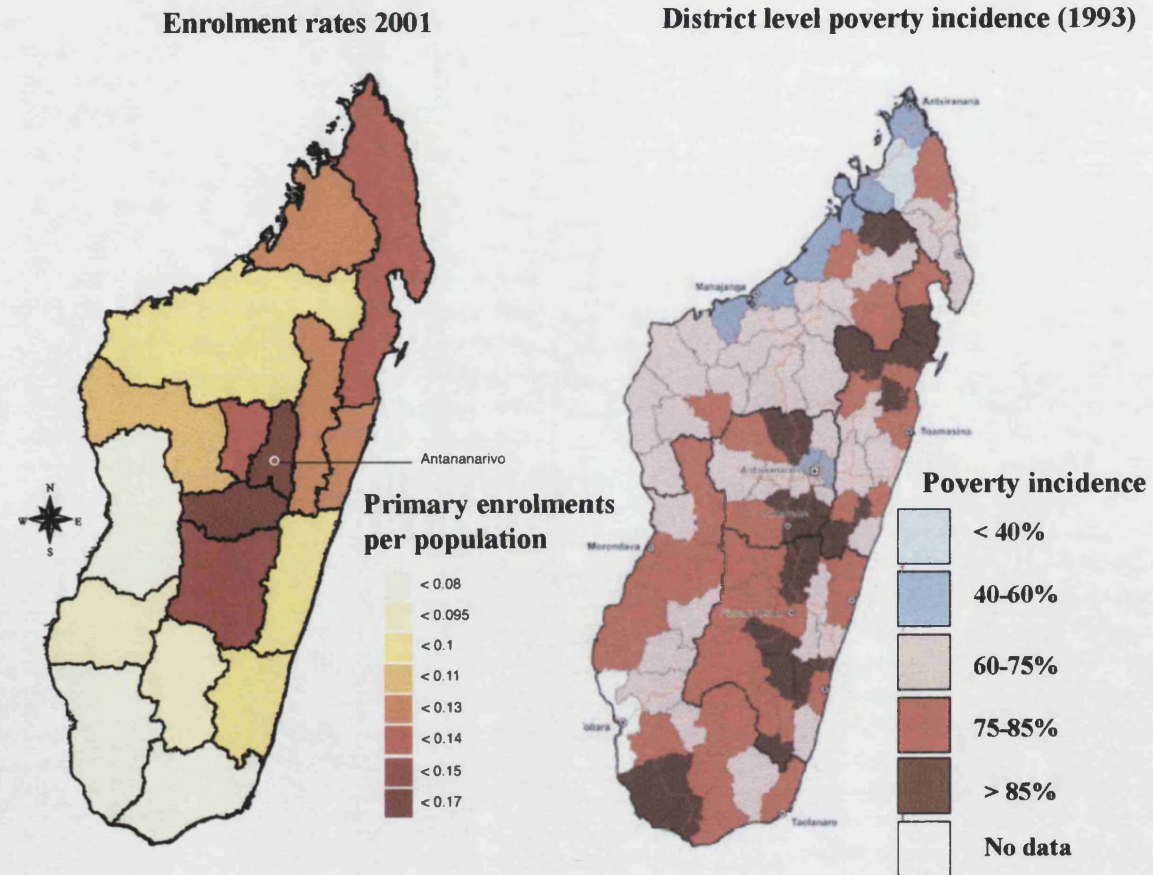
Source: author's estimations.

Source: Mistaen et al. 2003:50.

Today, areas in the southern highlands still have lower levels of economic development. For example, a comparison between the government's official poverty map and estimates of enrolment rates calculated for this chapter (see below for the description of this variable and the underlying data) indicate that areas in the southern highlands, which have better educational outcomes and a historically stronger presence of missionaries, actually have poverty rates well above the national average (Map Panel 2.4). Similar evidence is provided by other poverty assessments which find consistently that Fianarantsoa, the province which covers much of this part of the country has a higher poverty incidence than, for instance, areas in north west and on the east coast that were incorporated at a later stage into the Merina empire (see for example Razafindravonona et al. 2001, Romani 2003).

While geography and the political control of the Merina may thus have played a role in influencing the placement of missionary outposts in the country, it is unlikely that these alternative factors were associated with differences in the levels of economic development that would, by themselves, explain higher contemporary demand for education. If the southern highlands have higher educational outcomes today, this achievement was attained *against* the odds of other geographic and economic influences that would have otherwise constrained local school attainments. Missionary activity in these regions really does appear to have provided an exogenous shock, creating favourable conditions for the widespread adaptation of modern education that would have been unlikely to emerge in its absence.

In the light of these arguments a final potential source of unobserved biases are more fundamental cultural divides between people of the highland and coastal areas. While the Merina and Betsileo of the central highland are of Polynesian descent, the inhabitants of the coastal areas are of African (Bantu) and Arab origin. These ethnic differences between the highland and the coastal populations are often brought up in discussions of contemporary political and

social divides in Madagascar (see Chapter 1, Ellis 2009, Stifel et al. 2008).[86] Moreover, they may explain why both Merina influence and Christian missionaries were historically concentrated in the highland regions. For example, Deschamps (1960) argues that the early expansion of the Merina empire in the southern highlands was primarily driven by the cultural affinity between the Merina and ethnic groups inhabiting the southern highlands (Ankaratra, Andrantsay, Betsileo).[87]

The cultural divide between the highland and coastal populations could influence the observed differences in educational outcomes, if it can be shown that the highland populations really did have a stronger cultural affinity towards both Christianity and modern schooling. However, historical accounts of early missionary campaigns in the region provide little support for this hypothesis. Even though the spread of missionary activity in Madagascar in the 19th century coincided with the interest of Merina rulers, most historical chroniclers agree that up to 1868, when the entire Merina crown officially converted to Christianity, the history of missionary involvement was marked by repeated setbacks, which reflect a strong local resistance to the 'foreign' beliefs introduced by the early missionaries. For example, while missionaries were invited by King Radama I, many church representatives were again expelled under the rule of Radama's widow and heiress Queen Ranavalona I (Ranavalona I also prosecuted and executed many recent converts). Likewise, Ranavalona's successor Radama II opened the Merina empire again to Christian missionaries, and was assassinated in a public protest against the growing European influence (see for example Allen 1995: 22f). Anglican and especially French Catholic missionaries subsequently became engulfed in and associated with the interest of outside European powers, which further increased tensions between Malagasy nationalists and the main churches. In particular the Catholic Church only managed to establish itself more

---

[86]Recently, political cleavages between costal and highland people erupted in a political crisis in 2001 / 2002 when an incumbent president from the coastal areas was pitted against a contesting candidate from the central highlands (see for example Marcus 2004).

[87] "Il y avait là des régions quasi vides, mais théoriquement merina, d'où étaient peut-être venus les ancêtres." ("There were quasi empty regions, but theoretically Merina, where the ancestors possibly came from." Deschamps 1960: 123, author's translation).

permanently under the protectorate of the French colonial forces (Raison-Jourde 1991, Allen 1995).

With respect to the southern highlands, there are even stronger reasons to assume that local populations did not initially welcome early missionaries. Most of these areas had only recently been subjugated by the Merina empire when Christian missionaries arrived, and the presence of missionary outposts was often encouraged by Merina rulers to secure control over the conquered populations (Raison-Jourde 1991, Allen 1995). This means that it is very likely that missionaries were seen as an extension of the occupying Merina power, but not as a benevolent force to be welcomed by local inhabitants. Moreover, as was argued above, the geographic distribution of missionary outposts in these regions was often driven by considerations and interests of the church rather than by a possible 'demand' of the local population. In particular Catholic missionaries often intended to crowd out the influence of 'foreign' Anglican and Norwegian missionaries, and thus Catholic outposts and schools were often deliberately placed in areas that had already been covered by Anglican and Lutheran churches (see for example Koerner 1999, Raison-Jourde 1991). In the words of one observer, "white missionaries and the Malagasy clergy were often imperialists in their own right who operated under the protection of two flags, their own and that of the Merina monarchy" (Gow 1992: 451). It is thus very improbable that the spread of missionaries in the Malagasy highlands was associated with any cultural particularities of the local population that would directly explain both the stronger Christian presence and higher educational outcomes in these areas.

Notwithstanding these contextual arguments my analysis below controls more formally for possible unobserved cultural factors behind current educational inequalities. Before doing so I discuss at more length the characteristics of the non-Christian population in Madagascar.

2.5 Interreligious inequalities: evidence and research hypothesis

Previous estimates suggest that 'traditional' believers in Madagascar account for about 50% of the total population, followed by the two large Christian confessions which are estimated at about 40% of the population.[88] However, in spite of their large population share there has been little analysis of the living conditions of non-Christian households.[89]

This omission is hard to justify in the light of evidence that emerges from data available for this study. Sample estimates from a national household survey suggest that children growing up in families that practice traditional beliefs only have a likelihood of about 39% of being enrolled in primary school, little more than half of that of Catholics (71%) and Protestants (76%).[90] This difference is mostly driven by private school enrolments, where attendance levels are significantly higher among Catholics and Protestants than among non-Christians (see Table 2.1). Very similar trends in enrolments are revealed by an additional micro-level survey collected by different teams of field enumerators two years later in three case study communities in Madagascar. In this study 55% of households headed by traditional believers reported no children in school, compared to 24% among Catholics and 20% among Protestant households (Lupo

---

[88] See for example CIA World Fact Book. https://www.cia.gov/library/publications/the-world-factbook/geos/ma.html#People. Accessed May 2009. The Christian population is dominated to roughly equal degrees by the Catholic and Protestant/Lutheran churches. Anecdotal reports about the rapid rise in membership of various Evangelical and Pentecostalist churches were not supported by the survey data consulted for this study. As a consequence, these groups are not separately accounted for in the following analysis. Muslims, Hindus and other religions groups account for less than 10% and are omitted in the remaining analysis. However, their school outcomes are similar to those of the two major Christian denominations (see Table 2.1). Robustness tests not reported here suggest that excluding religious minorities did not significantly alter the outcomes presented below.

[89] Most assessments of poverty and inequality in the country compare levels of wellbeing across regions, income quantiles or ethnic groups (see for example Razafindravonona et al. 2001, Romani 2003, Stifel et al. 2008). To my knowledge there have been no prior poverty and inequality comparisons across religious lines.

[90] Estimates based on national household survey data for 2001, rural sample only. The survey is described below.

2004). See also my results in Chapter 4, which presents similar differences on adult literacy rates, using Demographic and Health Survey data.[91]

While the historical evidence presented in the preceding section provides some indication that the large gap in enrolments between Christians and non-Christians may reflect historical inequalities in the provision of schooling, it is important to consider other household or group-specific attributes that may explain the observed differences in outcomes. An evident starting point is the beliefs and customs associated with traditional religions in the island.

Even though religious practices vary across the different socio-economic groups of Madagascar, all traditional beliefs encountered in the island share a foundation in an ancestral cosmology. Ancestors (often translated as *razana*) are viewed as intermediaries between the living and the divine creator (*Zanahary*), and take a direct part in the destinies of the living (Bloch 1971, Rakotomalala et al. 2001, Evers 2002, Middleton [ed.] 1999). In most parts of Madagascar, this link to the dead is manifest in ceremonies to honour the ancestors, as well as the family's burial tomb, which is constructed and maintained at high costs on the land inherited from earlier generations (*tanindrazana*—land of the ancestors).[92]

While ancestral beliefs may be associated with 'anti-modern' attitudes to schooling, most observers of Malagasy society would reject attempts to explain lower educational outcomes among the non-Christian population on the basis of this factor. A common thread that runs through most ethnographic and historical accounts of contemporary Malagasy culture suggests that Christianity never penetrated ancestral belief systems sufficiently to justify claims that variations in

---

[91] This survey included 448 households, randomly sampled in three rural municipalities in distinct geographic regions of the island. The estimates presented here exclude households with no school age children. More details on this study are available on request by the author.
[92] These tombs fulfil important social functions for Malagasy families, such as offering a space for social ceremonies or demonstrating that a household belongs to an established kinship lineage. In reverse logic, people who do not have a family tomb are often perceived to be of lower social rank, given that landlessness was traditionally associated with slavery (see for example Evers 2002).

educational outcomes between religious groups are determined by differences in the fundamental value systems of Christians and non-Christians (see for example Bloch 1971: 14f, 2002, Rakotomalala et al. 2001, Evers 2002). Today, ancestral beliefs are relatively well assimilated by the various Christian denominations, a fact that is also apparent to casual observation by the blending of Christian and ancestral burial ceremonies as well as the large number of family tombs maintained by Christian city dwellers (often these tombs are adorned with a Christian cross but they otherwise resemble more traditional family tombs).[93]

Table 2.1. Socioeconomic indicators by religious group

	Catholic	Lutheran / protestant	Traditional	Other
Primary enrolment rate	70.7%	75.6%	38.8%	68%
Public school enrolment rate	47.4%	57%	35.5%	53.5%
Private school enrolment rate	23.3%	18.6%	3.3%	14.4%
Per capita expenditure (in Malagasy Franc)	1099832	1146456	726905	1041989
Average food share	0.67	0.66	0.75	0.67
Average proportion of self produced food in food share	0.20	0.19	0.32	0.19
Average household size	4.64	4.68	4.67	4.76
Household head with primary education	45.3%	42.3%	35.5%	37.6%
Household head with secondary education	20.5%	18.5%	5.1%	17.5%
Spouse primary education	47.7%	46.9%	31.4%	42.0%
Spouse secondary education	17.8%	18.6%	2.6%	17.9%

Source: Author's calculations, National household Survey 2001, rural sample only.

A more realistic explanation of the lower educational outcomes among non-Christians appears to lie in more general socio-economic characteristics of this group. Descriptive statistics estimated for the rural sample from national household survey data (Table 2.1) indicates that non-Christian household heads and their partners tend to be poorer and less educated than their Christian

---

[93] For example customary ceremonies practiced in the highlands, such as the famous *famadihana* ("placing" or the "turning" of the dead), are typically practiced by both Christians and non-Christians. Maurice Bloch, one of the most influential experts on Malagasy culture and politics, explains this relatively peaceful coexistence of Christian and ancestral belief systems with the fact that early missionaries only targeted the worship of pagan idols while devotion to ancestors appeared to be more compatible with the Christian idea of resurrection (Bloch 2002).

counterparts (differences are particularly notable in the case of secondary education). Both of these factors are well known determinants of educational outcomes and may thus explain lower educational attainments among the children of non-Christian households. Likewise, traditional believers have higher shares of food expenditure and self-produced staples in their overall household consumption. This suggests that the former group is more likely to engage in agricultural activities and subsistence farming, activities which require less formal education than other types of employment in the non-farming sectors.

However, there are strong signs that the spatial organization of the major religious groups may also contribute to the observed inequalities in educational outcomes. The Duncan dissimilarity index, a widely used measure of segregation, here calculated for the rural sample of the national household survey, is 0.79 for the direct comparison of Christians and traditional believers.[94] This is a high value, indicating that Christians and non-Christians generally live in distinctly different areas of the island (the measure was 0.34 for the direct comparison of the major Christian confessions, suggesting that there is less segregation between these groups).

This strong degree of religious segregation would be consistent with the argument proposed here if it can be shown that the spatial organization of traditional believers overlaps with historical and contemporary inequalities in school provision and educational outcomes. In the following, I provide empirical evidence in support of this hypothesis using a combination of historical data and municipal level information on contemporary primary school enrolment and graduation rates for almost all of the local authorities in the island. In a second step I turn to household survey data in order to account for possible individual or household level influences that may contribute to differences in educational outcomes between religious groups within the same geographic area. However,

---

[94] More specifically the index used here is the familiar dissimilarity index D described in Duncan/Duncan (1955). The index was calculated at the community level, using survey sampling clusters as the local unit of analysis.

given the sample restrictions of this survey, this analysis is carried out at higher levels of spatial aggregation.

2.6 Geographic analysis

A problem in carrying out the type of analysis proposed here is the scarcity of high-quality data that would permit linking historical information on missionary activity to contemporary socio-economic outcomes in Madagascar. National household surveys, now available through the National Statistics Institute of Madagascar (INSTAT), are only carried out in a small fraction of communities and are not designed for in-depth analysis of group-level interactions at the local level. Similarly, the last population census, which would avoid such sampling issues, dates from 1993 and is therefore not suited to capture inequalities in school supply that resulted from the sharp contraction in education expenditure in the 1990s.

In the following I circumvent these data deficiencies by relying primarily on geographically aggregated statistics on educational outcomes and socio-economic characteristics. These are available from a community census that was implemented in collaboration between Cornell University and the Malagasy national agricultural research institute FOFIFA in almost all of the approximately 1,350 municipalities of the island.[95] This census provides municipal-level school administrative data, including the total number of students enrolled in public and private primary schools, primary school graduation rates, as well as a number of variables describing education coverage and quality (in addition, the census recorded information on local infrastructure endowments and road accessibility, which can be used to control for remoteness and local living standards in the following analysis). Where possible, this geographic data is linked to the much smaller national household survey sample to carry out additional robustness and

---

[95] Field work was carried out between September and December 2001. In the meantime a redrafting of municipal boundaries has increased the number of local authorities to over 1,500.

validity tests and to incorporate information on household attributes into the analysis that are not available in the community census. Moreover, the national household survey is used to analyze household level determinants of educational inequalities in the second step of my analysis.

Similar issues of data availability arise with respect to the proposed historical analysis. Historical information on missionary activity in the 19th and early 20th century is generally not sufficiently detailed and disaggregated to predict spatial inequalities in educational outcomes today. However, archival work carried out for the purpose of this research enabled me to construct two variables that may serve as a proxy for the historical distribution of missionary activity. These are: (i) the number of missionary staff of the Catholic Church per 1,000 inhabitants in all 10 Catholic dioceses in the island in 1945, and (ii) the population proportion of Catholics in all 17 dioceses in 1977.[96] Even though the time period covered by these variables falls after the pre-colonial period, the available information may be considered as a useful proxy for the historical distribution of Christians in the island if there is no indication of significant changes in the spatial distribution of Christians and non-Christians over time. Moreover, the strong historical overlaps in the regions covered by Catholic and Protestant missionaries in the 19th century and the low levels of spatial segregation observed between Catholics and Protestants today suggest that inferences made about the historical presence of the Catholic Church are also valid for the other major Christian denominations in Madagascar. The next section presents evidence in support of both of these assumptions.

---

[96] Archival work was carried out at the archives of the LSMS in London in July 2008. The larger number of dioceses in the second variable is explained by the division of several larger dioceses between 1945 and 1977. Note that even the second variable is not sufficiently disaggregated to serve as an instrument in the analysis of household level schooling decisions (see below). As a consequence both variables are used as explicit regressors in the subsequent estimations.

2.6.1   Descriptive analysis

A useful starting point to assess the validity of the two historical proxies is to compare the spatial distribution of these variables with the outreach of Christian missionaries in the 19th century. Map Panel 2.5 contrasts the historical distribution of Christians, as measured by the population proportion of Catholics in 1977 with the historical missionary map of around 1890 (Map 2.3). The distribution of Catholics in 1977 coincides roughly with the areas that had higher levels of missionary activity in the 19th century. The strongest concentration of Catholics is encountered in the highland regions, with particularly high population proportions in the southern highlands (near today's cities of Antsirabe and Fianarantsoa), and slightly smaller shares in the areas around the capital Antananarivo. In contrast, the south-western and north-western parts of the island where missionary involvement was less strong have the lowest proportion of Catholics in 1977.

An extension of this comparison to the distribution of estimated enrolment rates in 2001 also provides support for the hypothesized relationship between the historical presence of Christians and contemporary educational outcomes. Enrolments are highest in the central and southern highlands and lowest in the southwest. The only exception is the northern part of the island, where enrolment rates are higher than would be expected from the historical distribution of Catholics.

Map Panel 2.5. Historical distribution of Christians and current enrolment rates

Historical map of missionary activity (1890)	Proportion of Catholics in 1977	Enrolment rates 2001t

Source: Middleton [ed.] 1999:100.

Proportion Catholics 1977

> 0.06
> 0.075
> 0.1
> 0.15
> 0.3
> 0.4
> 0.45
> 0.5

Source: author's estimations.

Primary enrolments per population

< 0.08
< 0.095
< 0.1
< 0.11
< 0.13
< 0.14
< 0.15
< 0.17
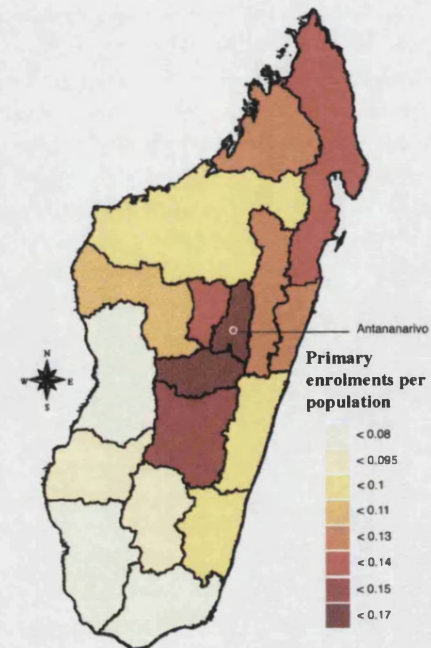
Source: author's estimations.

Another useful comparison involves the availability of school infrastructures and other relevant socio-economic characteristics between predominantly Christian and non-Christian areas. Table 2.2 uses the proportion of Catholics in 1977 to contrast present day outcomes in key educational and socio-economic indicators between communities in regions with a stronger historical presence of Christians and communities in areas with a lower historical share of Christians (Table 2.2, Column 1 and 2; the cut off point is the variable median). Contemporary statistics include information on municipal-level infrastructure endowments, school administrative data from the aforementioned community census and sample estimates of average household consumption from the national household survey. Urban areas are excluded to avoid possible biases in the analysis that would result from more general urban–rural differences.

Columns 3 and 4 present an alternative breakdown that distinguishes between communities with a majority of Christians and traditional believers using information from the 2001 household survey. This latter comparison, albeit only available for a much smaller sample of municipalities, offers a more fine-grained picture of the distribution of Christians and non-Christians than the more aggregate breakdowns by 1977 diocese data. Moreover, it allows accounting for the possibility of recent changes in the spatial organization of the major religious groups.

Table 2.2. Comparison of Christian and non-Christian areas

	Majority non-Catholics 1977 (diocese)	Majority Catholics 1977 (diocese)	Majority non-Christians 2001	Majority Christians 2001
Column	(1)	(2)	(3)	(4)
Proportion enrolled in primary school	**0.52**	**0.73**	**0.34**	**0.69**
	(0.03)	(0.02)	(0.06)	(0.02)
Primary schools per village	**0.95**	**1.49**	**0.92**	**1.29**
	(0.06)	(0.13)	(0.09)	(0.08)
Primary class rooms per 1000 inhabitants	**1.96**	**3.19**	**1.75**	**2.79**
	(0.18)	0.22)	(0.17)	(0.17)
Proportion of private schools	**0.11**	**0.36**	**0.10**	**0.26**
	(0.02)	(0.04)	(0.02)	(0.03)
Number of secondary schools per municipality	**0.66**	**0.88**	**0.51**	**0.85**
	(0.05)	(0.06)	(0.07)	(0.04)
Student teacher ratio	**60.90**	**57.65**	**56.24**	**60.77**
	(3.43)	(4.17)	(2.33)	(3.33)
Average per capita expenditure (in 1000 FMG)	**818.47**	**1112.45**	**718.16**	**1037.59**
	(40937.44)	(113356.40)	(39499.24)	(72339.12)
Share auto-consumption in hh expenditure	**0.28**	**0.23**	**0.34**	**0.23**
	(0.02)	(0.03)	(0.02)	(0.02)
Population proportion in 1st exp quartile	**0.44**	**0.34**	**0.49**	**0.36**
	(0.03)	(0.04)	(0.04)	(0.03)
Population proportion in 2. exp quartile	**0.30**	**0.30**	**0.31**	**0.29**
	(0.02)	(0.03)	(0.02)	(0.02)
Population proportion in 3. exp quartile	**0.18**	**0.21**	**0.15**	**0.20**
	(0.01)	(0.02)	(0.02)	(0.01)
Population proportion in 4. exp quartile	**0.08**	**0.16**	**0.05**	**0.14**
	(0.01)	(0.04)	(0.01)	(0.02)
Average population size of municip.	**20932.82**	**24243.21**	**16838.19**	**24580.47**
	(1720.74)	(2010.35)	(1083.58)	(1659.87)
Communities with no road access	**0.24**	**0.10**	**0.29**	**0.14**
	(0.05)	(0.05)	(0.07)	(0.04)
Number of missionary staff per 1000 inhabitants 1945	**0.19**	**0.38**	**0.17**	**0.31**
	(0.01)	(0.03)	(0.01)	(0.02)

	Majority non-Catholics 1977 (diocese)	Majority Catholics 1977 (diocese)	Majority non-Christians 2001	Majority Christians 2001
Proportion of Catholics in diocese 1977	0.09	0.36	0.12	0.24
	(0.01)	(0.02)	(0.01)	(0.01)
Presence of admin. buildings before 1960	0.54	0.66	0.45	0.63
	(0.05)	(0.05)	(0.09)	(0.04)
Proportion traditional believers today	0.37	0.09	0.62	0.10
	(0.05)	(0.07)	(0.09)	(0.05)
Proportion Catholics today	0.26	0.43	0.07	0.44
	(0.04)	(0.03)	(0.04)	(0.01)
Proportion Protestants today	0.27	0.43	0.06	0.45
	(0.02)	(0.03)	(0.01)	(0.02)

Source: Author's calculations, 2001 National Household Survey and community census. Population estimates for the rural sample. Standard errors in parentheses.

The first question that needs to be addressed is whether the high level of spatial segregation observed between Christians and non-Christians indeed reflects imbalances in the historical level of missionary activity and not more recent processes of population sorting that may be indirectly related to current educational outcomes. For example, it could be hypothesized that, since family tombs are established on inherited land, households that adhere more closely to "traditional" ancestral belief systems are more likely to stay within their native communities, while more 'progressively'-minded individuals might seek new economic opportunities in more dynamic urban areas. Such differences in location choices would imply that the concentration of traditional believers in areas with lower levels of school supply would be endogenous to religious status of the household—with the resulting complications for the causal identification of link between geographic education determinants and school outcomes postulated here.

Available evidence suggests that domestic migration in Madagascar is not sufficiently systematic to offset patters of religious segregation established in the colonial and pre-colonial period. Land and labour markets are often sticky and there

is relatively low incidence of rural to urban migration (in 2006 the estimated share of the urban population in Madagascar was about 27%, very low for global standards and still below the average in sub-Saharan Africa).[97] Other forms of migration observed in the island are mostly seasonal, as inhabitants of rural areas frequently seek temporal employment in the lean period between harvests (Dissou et al. 2000). Yet, this migration is less likely to influence educational outcomes as it typically only involves young or single men but less frequently entire households or children in the schooling age (see for example Freeman 2001).[98]

The data presented in Table 2.2 support this impression. While there are some changes in the population shares of the major groups between 1977 and today, Catholics and Protestants together continue to account for the majority of the population in the areas with a historically stronger presence of Catholics in 1977.[99] This finding suggests that population mobility is relatively low and that there have been few changes in the overall distribution of different religious groups in the island.[100] Moreover, the population proportions of Catholics and Protestants in predominantly Christian areas are relatively stable across both breakdowns (even though the breakdown by contemporary population shares of non-Christians suggests that there is more segregation in predominantly non-Christian areas). Both of these

---

[97] Source: UN statistics division: http://data.un.org/CountryProfile.aspx?crname=Madagascar. Accessed July15th 2008.

[98] Another possibility is that migration occurs within rural areas. For example a classic study on migration in Madagascar by Deschmaps (1959) argues that most migratory movements take place within well-defined rural regions of the island. However, while this form of migration often takes individuals away from the modern school network (most of it occurs in search for new plots of arable land), it is generally too slow to explain more aggregate level disparities on which I focus in the following sections. Deschamps reports that rural to rural migration typically involves very short distances and may take place over several generations. See also Freeman 2001 for more recent ethnographic evidence on the same phenomena.

[99] Note that differences between 1977 and 2001 may also be explained by variations in the way population proportions were measured in the two time periods. While the data for 1977 draws on church census data, the estimates for 2001 are sample estimates.

[100] Another variable available from the community census describes whether communities had French colonial administrators on their territory. The data indicate a link between this variable and the proportion of Catholics in 1977, thus providing additional support for the assumption that my historical proxies do indeed capture historical differences in the socio-economic development of predominantly Christian and non-Christian communities.

findings encourage me to treat the two historical variables as a valid proxy for the historical presence of Christians in the subsequent analysis.

Turning to educational outcomes, the two comparisons confirm the existence of significant geographic inequalities in educational achievements between predominantly Christian and non-Christian areas. In the breakdown based on 1977 diocese data, enrolment rates in areas with a historically smaller proportion of Christians are still only modestly above 50%. This disparity in school participation rates becomes even more marked in the more fine-grained comparison, with only about one out of every three children in predominantly non-Christian areas attending primary schools (compared to about 70% of enrolments in mostly Christian areas).

Inequalities in the supply of school infrastructures are likely to explain some of these differences in outcomes. Rural areas with a historically lower proportion of Catholics still benefit on average from less than two-thirds the number of primary schools and class rooms available to populations in areas with a historically larger presence of Christians. Part of this difference is due to very unequal distribution of private schools, which account for a much smaller proportion of primary facilities in the predominantly non-Christian regions than in the rest of the island (11% compared to 36%). I demonstrate below that this uneven distribution of private education provision adds significantly to differences in educational outcomes between Christians and non-Christians today.

More general geographic and economic characteristics of Christian and non-Christian areas may also influence the observed variations educational outcomes. Communities in dioceses with a historically lower proportion of Christians tend to be more remote (almost a quarter of them are without road access) and a much larger share of the population falls into the bottom quartiles of the income distribution. As was already hypothesized above, it is possible that these strong variations in living

conditions contribute to lower enrolment rates, as a higher incidence of poverty in the more disadvantaged non-Christian areas would reduce returns to education and make it more difficult for households and communities to afford school fees. The following paragraphs analyze these interactions between supply and demand side factors in a more formal regression-based framework.

2.6.2 Geographic determinants of educational inequalities – community census estimates

The community census available for this study permits a more systematic analysis of the described interactions between geography, history and school demand. Administrative data on primary school enrolments are available for over 1,200 of the island's municipalities, and primary school graduation rates—albeit less systematically recorded—are on hand for over 860 local authorities. Combined with the information on the historical presence of Catholics, these variables can be used for a very disaggregated analysis of the link between historical inequalities in school provision and educational outcomes today.[101]

However, before this analysis can proceed two problems need to be addressed. The first is that the community census, like most other recent data sources on educational outcomes in Madagascar, does not report up-to-date age cohort estimates that would be needed to calculate school enrolment rates (this is due to the lack of recent population census data). In this analysis I circumvent this problem by calculating school attendance rates in proportion to the total local population, using municipal-level population estimates reported in the community census.

---

[101] The following analysis does not include information from the national household survey, due to the relatively small sample sizes of this data set.

111

It is important to point out that this procedure may lead to measurement errors and possible bias if the student population of primary schools in municipalities with a historically larger share of non-Christians has a different age structure than the universe of primary students in the rest of the sample. For example, it could be that children in areas with a historically lower share of Christians spend more years in primary schools due to the lower quality of schooling in these areas and resulting higher likelihood of grade repetitions. Such a difference in the years spent in the primary school system would lead to a positive bias in enrolments rates when the latter are estimated in proportion to the overall population, rendering the estimates of the following regressions inconsistent.

Table 2.3. Age structures across Christian and non-Christian municipalities

Historical proportion of Catholics in diocese (1977)	Mean age of primary school children	Standard deviation	Mean age entire population	Standard deviation	Mean age prim school children relative to total population
1st 10%	9.07	1.99	20.49	17.64	0.44
2nd 10%	8.80	1.97	20.29	17.35	0.43
3rd 10%	8.93	2.03	20.30	17.38	0.44
4th 10%	8.89	2.04	22.59	18.78	0.39
5th 10%	8.94	2.21	21.45	18.42	0.42
7th 10%	8.72	2.45	20.95	17.64	0.42
8th 10%	8.85	2.07	22.35	18.55	0.40
9th 10%	9.05	1.93	22.49	18.04	0.40
10th 10%	9.32	1.80	21.50	18.84	0.43

Source: Author's calculations, National Household Survey 2001. Survey estimates of schooling age in municipalities that differ by historical proportion of Catholics. Communities with lower historical proportions of Catholics are on top.

However, in reality the age structure of the school going population in the household survey tends to be relatively stable when compared to the historical proportion of Catholics in an area, with slightly higher mean ages at the two ends of the distribution of the historical variable (see Table 2.3; this trend holds independent of whether student's age is considered in isolation or in relation to the overall age of

112

the population).[102] As a consequence, I assume here that the following estimations are not biased by underlying measurement error.[103]

The second problem arises from the relatively large number of missing observations for primary school graduation rates. Closer analysis reveals that information is typically absent for municipalities that have lower average proportions of Catholics and have lower enrolment rates than the rest of the island. Excluding these communities from the analysis may thus bias the estimation results and render subsequent conclusions invalid. In the following I deal with this problem with the help of a Heckman selection model that is typically employed under similar circumstances. While there is no evidence of sample selection bias, the results reported in Table 2.5 below reflect the more conservative estimates from the Heckman estimation method (see Table 2.17 in the annex to this chapter for the results of the selection equation).[104]

The basic model estimated is a simple linear regression of the following form (selection equation for the school graduation equation omitted):

$$Y = \alpha X + \beta Z + c + \varepsilon \tag{1}$$

---

[102] There are various explanations for this trend. One is that schools in areas with a higher historical share of Christians are more likely to offer the full primary cycle, thus keeping children in school for a longer period. Another is that the average age of the overall population is higher in these communities. This should reduce the relative age of the school going population (the latter may reflect higher living standards in predominantly Christian communities).

[103] In another robustness check I estimated cohort specific enrolment rates for 59 districts of the island that had sufficiently large sample sizes in the 2001 household survey. A regression with the same set of explanatory variables confirmed the directions and statistical significance of the key parameters reported below.

[104] The selection process is identified by the distance to the capital, a set of province dummies and the local proportion of private primary schools. The choice of the latter variable is motivated by the observation that it private school graduation rates are less frequently reported than those of public schools.

where Y stands for the dependent variable being estimated (primary school enrolments or graduation rates), α is the coefficient for the two proxies on the historical presence of Catholics in a diocese (vector X), β stands for the set of coefficients of a vector of controls on school supply and other economic and geographic community characteristics that may also effect educational outcomes at the municipal level (Z), c is a constant term and ε is the regression residual assumed to be orthogonal to the remaining variables.

Separate regressions are estimated for each of the two outcome variables, using either the number of missionary staff per 1,000 inhabitants in 1945 or the population proportion of Catholics in 1977 to approximate the historical presence of Christians in an area. Moreover, each of these regressions differ with respect to the range of control variables included on the right hand side. In the first set of estimations I control only for general geographic and economic characteristics of municipalities. These controls include the dry season travel time to the nearest urban centre, road accessibility of a municipality, as well as an index variable describing the availability of basic social and economic infrastructures in the municipality.[105] This model also controls directly for reported population sizes, in order to account for possible biases due to inflated population figures.

In a second step, I add further school-specific controls to account for possible variations in contemporary education supply and quality. The variables included are the average local student-teacher ratio in local primary schools, as well as the number of primary schools per village and per 1,000 inhabitants within a municipality. In addition I control for the proportion of students in private primary schools in order to account for the fact that a larger share of students in higher-

---

[105] This index is intended to capture the general level of economic development in the community. It consists of the first component score of a principal component analysis that summarizes information on the local availability of markets, agricultural extension services, bus stops, post offices, secondary schools and health posts. See Stifel et al. (2003) for an analysis of spatial inequality in Madagascar that uses a similar index based on the same data.

quality private schools may positively affect educational outcomes in the municipality. All variables are normalized to facilitate direct comparisons of the magnitudes of the individual coefficients (see Table 2.16 in the annex for descriptive statistics).

Table 2.4. Determinants of primary school enrolment rates

	(1)	(2)	(3)	(4)
Missionary staff	**0.188***	**0.070***		
1945	**(0.027)**	**(0.022)**		
Proportion of			**0.272***	**0.135***
Catholics 1977			**(0.027)**	**(0.027)**
Dry season travel	-0.112***	-0.046**	-0.067***	-0.026
time	(0.026)	(0.018)	(0.026)	(0.018)
No road access	-0.001	-0.038**	-0.003	-0.039**
	(0.029)	(0.019)	(0.028)	(0.018)
Infrastructure index	0.397***	0.331***	0.372***	0.326***
	(0.042)	(0.031)	(0.042)	(0.031)
Population size	-0.894***	-0.172**	-0.880***	-0.153**
	(0.098)	(0.071)	(0.097)	(0.071)
Proportion of		0.080**		0.054
students in private		(0.035)		(0.036)
Student teacher		0.275***		0.269***
ratio		(0.047)		(0.047)
Schools per village		0.025		0.008
		(0.029)		(0.030)
Schools per 1000		0.819***		0.815***
inhabitants		(0.040)		(0.040)
Constant	-0.038	0.024	-0.033	0.026
	(0.024)	(0.018)	(0.023)	(0.017)
Observations	1244	1244	1244	1244
R-squared	0.200	0.619	0.231	0.627

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Estimates exclude municipalities with population sizes larger than 80,000 inhabitants. Source: Author's estimation based on community census.

The estimation results of this first set of regressions confirm the persistence of the effect of the historical presence of Christians on contemporary educational inequalities (see Table 2.4 for determinants of school enrolment rates and Table 2.5 for graduation rates). While educational outcomes in a municipality are strongly

associated with better infrastructure endowments, the historical presence of Christians clearly has a strong and non-negligible effect as well. An increase of one standard deviation in the number of religious staff in 1945 raises enrolment and graduation rates by approximately 19% and a one unit increase in the proportion of Catholics in 1977 is associated with an increase in enrolments and graduation rates of 27% and 16% respectively.

Table 2.5. Determinants of primary school graduation rates

	(1)	(2)	(3)	(4)
Missionary staff	0.190***	0.144***		
1945	(0.036)	(0.037)		
Proportion of			0.161***	0.108***
Catholics 1977`			(0.029)	(0.033)
Dry season travel	-0.094**	-0.074*	-0.072*	-0.064
time	(0.042)	(0.042)	(0.043)	(0.042)
No road access	-0.012	-0.013	-0.007	-0.009
	(0.040)	(0.038)	(0.039)	(0.038)
Infrastructure index	0.230***	0.182***	0.224***	0.181***
	(0.038)	(0.039)	(0.038)	(0.039)
Population	0.115	0.004	0.108	0.016
	(0.114)	(0.122)	(0.114)	(0.123)
Proportion of		0.114***		0.104**
students in private		(0.039)		(0.044)
Student teacher		-0.081**		-0.084**
ratio		(0.040)		(0.041)
Schools per village		0.082***		0.073**
		(0.031)		(0.031)
Schools per 1000		-0.102**		-0.087*
inhabitants		(0.049)		(0.048)
Constant	0.023	0.041	-0.070	-0.026
	(0.089)	(0.080)	(0.073)	(0.074)
Observations	1249	1249	1249	1249

*** p<0.01, ** p<0.05, * p<0.1   Robust standard errors in parentheses. Estimates exclude primary urban centres. The results are the second stage of a Heckman selection model to account for possible sample selection bias (see Table 2.17 annex, for the first stage results). Source: Author's estimates based on community census

As can be expected, the inclusion of variables on school access and quality significantly reduces the estimated effect of the historical presence of Catholics in an area—indicating that the historical proxies in the initial estimates may have captured

underlying differences in education provision that are associated with the historical presence of Christians in a community. Yet, in both cases the effect of the two historical proxies remains statistically robust and its strength often outstrips that of most of the newly-added controls.[106]

Even though the controls for school supply and quality do not influence the signs and significance levels of the two historical proxies, the inclusion of these controls helps to uncover some variation in the underlying determinants of educational outcomes that are of interest in their own right. The first finding concerns apparent differences in the production of local primary school graduation and enrolment rates. In the case of school graduation rates, a larger number of primary schools per thousand inhabitants and a higher student-teacher ratio has a negative (albeit small) influence on the proportion of students who successfully complete the primary cycle, a result which suggests that it is primarily the larger, centralized schools in the country that are able to offer their students the necessary environment to graduate from the primary school cycle. In the case of primary school enrolments, the effects on both variables are reversed, suggesting that improved accessibility through the decentralized placement of facilities increases the probability for local children to attend school. These conflicting results may point to a dilemma for school planners, who appear to face a trade-off often observed in environments with constrained educational expenditures: they can either increase school coverage at the possible cost of lower school quality overall, or centralize resources in a smaller number of better performing schools.[107]

---

[106] Other robustness tests incorporated additional controls (including province identifiers to account for geographic inequalities in the distribution of private schools and other infrastructures not capture here) as well as alternative estimation formulas (tobit) to account for possible censoring effects on the school enrolment and graduation rate variables. None of these tests changed the signs or significance levels of the coefficients presented here.

[107] The proportion of students in private schools has a consistent effect on both enrolments and primary school graduation rates. This probably reflects the higher quality of private facilities.

The second important finding is the robust effect of the historical presence of Christians when school controls are included. While the coefficient for the two historical variables may pick up systematic differences in school quality between mostly Christian and non-Christian regions that are not captured by the school controls included here, the effect is sufficiently strong to suggest that even at given levels of school supply, inhabitants of areas that were traditionally dominated by non-Christians demand less education than those of predominantly Christian regions. This finding supports my earlier hypothesis that lower education demand and insufficient school supply typically interact in producing the large gaps in school outcomes in traditionally non-Christian areas.[108] The final section of this chapter turns to household survey data to analyze individual or household-level causes of these differences in school demand. However, before doing so I present an additional test for the robustness of the estimated effects of the two historical proxies.

2.6.3 Instrumental variable estimation

Even though the contextual evidence presented earlier in this chapter suggests that missionary activity in the 19th century constituted an exogenous shock that was unrelated to other geographic or historical processes that may explain current educational inequalities in Madagascar, it is possible that some of the observed outcomes are driven by more fundamental cultural differences between the highland and the coastal populations. Indeed, as was argued above, ethnic and socio-cultural differences between inhabitants of the highland and coastal areas are often invoked as a major factor behind political and social cleavages in contemporary Malagasy

---

[108] This interpretation receives further support when one considers the behaviour of the control on student-teacher ratios in the regression on school enrolment rates. Higher student-teacher ratios are actually strongly associated with higher enrolment rates, an indication that there are many regions in the sample where the demand for education outstrips the supply by public and private providers. However, high student-teacher ratios do have a negative effect on the proportion of primary school graduates, suggesting that the understaffing of schools reduces school quality.

affairs (see for example Ellis 2009). It is theoretically possible that these divides also explain some of the observed inequalities in educational outcomes.

To account for the possibility of such cultural influences, I carry out a formal test that would detect a resulting bias. Following an identification strategy proposed by Becker and Woessmann (2009) in their study of literacy rates in 19th century Prussia, I draw on the fact that missionary activity spread initially from the political centre of the Merina empire Antananarivo and use a community's distance to the capital as an instrument for the number of missionary staff in 1945 and the proportion of Catholics in 1977. This strategy tests the assumption that the outreach of missionary activity in the 19th century was indeed primarily determined by exogenous factors such as geographic accessibility or the political interest of the Merina rulers and Christian churches, but not by any cultural 'preferences' of the local populations for the Christian belief system and modern education.[109]

An immediate objection to this identification strategy is that distance to the capital may be an important determinant of educational outcomes in its own right. For example, proximity to the capital may be associated with a greater efficiency in the administration of public school budgets. Or it may lead to higher levels of economic activity, which could in turn trigger more demand for formal education. Both of these processes would imply that educational outcomes are endogenous to a location's distance to the capital, thus rendering the proposed instrument invalid.

While the data available for this study does not enable me to directly address these potential limitations of the instrument, some of these concerns may be dispelled by comparing the effect of a municipality's distance to the capital on enrolments and graduation rates with the effect of the dry season travel time between

---

[109] Note also that groups were already in place at the time when the Merina empire began to expand—thus the distribution of these groups itself does not appear to be related to its distance to the Merina capital.

a municipality and its nearest urban centre—a variable already included in the preceding regressions in its own right and that is often described as an important determinant of local levels of socio-economic development in Madagascar (see for example Stifel et al. 2003).

Table 2.6. Distance to capital and educational outcomes

	(1)	(2)	(3)	(4)
	Enrolment rate	Enrolment rate	Graduation rate	Graduation rate
Distance to	-0.067**	0.044	-0.063	0.026
capital	(0.028)	(0.029)	(0.041)	(0.043)
Dry season travel	-0.190***	-0.121***	-0.166***	-0.113***
time to nearest city	(0.029)	(0.028)	(0.037)	(0.037)
Proportion of		0.311***		0.195***
Catholics in 1977		(0.030)		(0.034)
Constant	0.005	0.005	-0.018	-0.029
	(0.027)	(0.026)	(0.033)	(0.032)
Observations	1319	1319	907	907
R-squared	0.048	0.121	0.035	0.069

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: Author's estimates based on the rural sample of the community census and national household survey data.

Table 2.6 presents the estimation results of a set of simple linear regressions of municipal-level enrolment and graduation rates on the instrument (distance to capital), the dry season travel time to the nearest urban centre, as well as—in an extended specification—the historical proportion of Catholics in a region in 1977.[110] In this analysis proximity to the capital only has a statistically distinguishable effect on primary school enrolment rates but not on school graduations. Moreover, the effect on enrolments is smaller than that of the dry season travel time and it disappears entirely when I account directly for the influence of the historical

---

[110] The estimation sample again excludes urban municipalities. Note that in particular in the case of communities in the vicinity of Antananarivo, distance to the capital and the nearest urban centre will be identical and thus collinear. Here this problem is reduced by measuring distance to the capital in kilometres and the distance to the nearest urban centre in hours (dry season average). The correlation coefficient between the two variables is 0.3.

120

presence of Christians. As a consequence, I assume that distance to the capital does indeed represent a legitimate instrument for the identification strategy proposed here.

Table 2.7. Instrumental variable estimates, school enrolments (controls omitted)

	(1)	(2)	(3)	(4)
First stage				
Dependent variable	Religious staff in 1945		Proportion of Catholics in 1977	
Km to capital	-0.417***	-0.417***	-0.435***	-0.435***
	(0.022)	(0.022)	(0.021)	(0.021)
R-squared	0.173	0.173	0.192	0.192
Second stage				
Dependent variable	Primary school enrolment rate		Primary school enrolment rate	
	Only community controls (omitted)	Community and school controls (omitted)	Only community controls (omitted)	Community and school controls (omitted)
Religious staff in 1945 (instrumented)	0.133**	0.106**		
	(0.058)	(0.049)		
Proportion of Catholics 1977 (instrumented)			0.127**	0.101**
			(0.055)	(0.046)
chi$^{2\ a)}$	192.10***	26.75***	175.34***	59.89***
Observations	1244	1244	1244	1244
R-squared	0.168	0.616	0.168	0.616

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. $^{a)}$ chi test statistic of a Hausman test for differences in coefficients between the relevant base model and its equivalent IV. A significant test statistic indicates that the differences between coefficients are not random. Source: Author's estimates based on community census data.

The instrumental variable regressions produce mixed results (see Tables 2.7 and 2.8. Tables 2.18 and 2.19 in the annex report the omitted community and school controls).[111] In both the enrolment and the graduation models, the introduction of the instrument reduces the coefficient of the two historical proxies, suggesting that there

---

[111] It is impossible that outcomes on the two historical proxies are influenced by contemporary community characteristics. As a consequence, the first stage regressions in the following estimations exclude other right-and side variables from the initial model that refer to these characteristics (see Pearl 2000 for a discussion of this particular causal model).

was some upward bias in the estimated effect of the historical presence of Catholics in the preceding regressions (as can be expected the instrumentation also reduces the efficiency of the estimate).[112]

Table 2.8. Instrumental variable estimates, school graduations (controls omitted)

	(1)	(2)	(3)	(4)
First stage				
Dependent variable	Religious staff in 1945		Proportion of Catholics in 1977	
Km to capital	-0.417***	-0.417***	-0.435***	-0.435***
	(0.022)	(0.022)	(0.021)	(0.02)
R-squared	0.173	0.173	0.192	0.192
Second stage				
Dependent variable	Primary graduation rate		Primary graduation rate	
	Only community controls (omitted)	Community and school controls (omitted)	Only community controls (omitted)	Community and school controls (omitted)
Religious staff in 1945 (instrumented)	0.071	-0.002		
	(0.107)	(0.109)		
Proportion of Catholics 1977 (instrumented)			0.068	-0.002
			(0.102)	(0.105)
chi$^{2\,a)}$	36.51***	48.56***	106.83***	31.98***
Observations	860	860	860	860
R-squared	0.092	0.124	0.092	0.124

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Estimates do not control for possible sample selection bias. [a)] chi test statistic of a Hausman test for differences in coefficients between the relevant base model and its equivalent IV. A significant test statistic indicates that the differences between coefficients are not random. Source: Author's estimates based on community census data.

---

[112] The only exception is the coefficient on the historical presence of Catholic missionary staff in 1945 in the enrolment model with school controls. This coefficient increases mildly in the instrumental variable regression. It is possible that this increase is caused by interactions between the school controls and the distance variables at lower levels of disaggregation than cannot be picked up by the diocese-level data available for 1945. The existence of bias in the remaining coefficients is also confirmed by the highly significant chi^2 test statistics of a Hausman test. This test rejects the null hypothesis that the coefficients in the standard OLS and instrumental variable estimations are equal.

However, in the case of enrolment rates model the effect still remains quite substantive and it is robust at the 5% level. In contrast, in the primary school graduation model the effect disappears. This suggests that the historical relationships postulated in this chapter influence contemporary educational outcomes primarily through their effects on school supply and accessibility. Current variations in graduation rates may be driven by other unobserved factors that cannot be identified with the help of the data available here.[113]

2.7   Individual schooling decisions –household survey estimates

The fact that the municipal level estimates in the preceding section did not rule out the possibility that lower educational outcomes in historically more disadvantaged regions of Madagascar are caused by systematically lower education demand raises the question whether religious affiliation—even if it is not usually freely chosen at the personal level—does influence educational outcomes after all. Do the aggregate lower outcomes in predominantly non-Christian areas just reflect a systematically lower propensity of non-Christian households to enroll and keep their children in school? In the following sections of this chapter I address this question by using household level data to assess whether there are differences in school choices between Christians and non-Christians *within* areas that are similar with respect to historical factors and current levels of school supply.

The analysis is divided into two steps. In a first step I trace differences in educational outcomes across individuals of older age cohorts, who have already passed the primary (and most of the secondary) schooling age, controlling separately for the historical presence of Christians and the respondent's own religious status. In

---

[113] For example, the effect of the two historical proxies might be expected to disappear in the instrumental variable estimation if these two variables really primarily pick up unobserved differences in school quality.

a second step I analyze determinants of school choices in the latest primary school age cohort for which data are available, controlling separately for a child's religious background and other common determinants of educational outcomes such as income and the educational background of a child's parents (Section 2.8). This analysis also accounts for differences in private school supply, which turns out to be a strong determinant of interreligious differences in primary school enrolments in Madagascar.

2.7.1 Schooling determinants in older age cohorts

The following analysis of educational outcomes among older age controls separately for the religious status of the respondent and the historical presence of Christians in his or her region of origin. A significant effect of the historical presence of Christians would in this context indicate that geographic inequalities created by the uneven provision of missionary school supply have an effect on educational outcomes that is independent of individual or household-specific attributes normally associated with uneven educational outcomes between Christians and non-Christians. Moreover, persistent inequalities in educational outcomes across age cohorts in the same religious group or region may point to uneven rates in the accumulation of modern education over time, a finding that would be consistent with the 'Non-Weberian' interpretation of the human capital model, outlined in the theoretical section of this chapter.

Data for this analysis are drawn from the 2001 national household survey. The Permanent Household Survey (*Enquête Permanente des Ménages*—EPM) is a nationally representative stratified and clustered household survey, covering approximately 5,080 households spread over 207 municipalities in the country. It is collected about every two years and contains information on the educational attainment of all household members, along with other indiviual and household

124

characteristics relevant for this study, such as an individual's religion, age, or family income or public service access. Moreover, unlike many other surveys in the developing world, this survey records the educational background of the parents of older household members. In the following analysis this information is used as an additional control to account for other household-specific determinants of educational achievement that are not captured by a person's religious status.

To capture the progression of educational outcomes across groups and regions over time the sample is divided into four age cohorts, each covering a period of 10 years (16-25, 26-35, 36-45, 46 or older).[114] The dependent variables describe, respectively, the individual's highest level of schooling (1=no school, 2=primary school, 3=secondary and higher education) and the highest degree obtained (1=no degree, 2=primary school degree, 3=secondary degree or higher).

The estimation takes the form of an ordered probit model estimating the latent relationship

$$Y_i^* = H_i\alpha + R_i\beta + X_i\gamma + c + \varepsilon_i, \qquad (2)$$

where Y^* stands for a latent variable that describes the progression of educational attainment of the respondent across the three categories of the dependent variables, H stands for the historical presence of Catholic missionary staff in an area in 1945 or the population proportion of Catholics in 1977, R for the religious status of the respondent (this consists of a set of dummy variables that identify Catholics and Protestants, leaving traditional believers as the reference category).[115] X stands for a vector of other controls, including a respondent's gender, age and the educational background of his or her father (measured by two dummy variables that

---

[114] The sample excludes individuals still at school or university.
[115] Again, other religions that only accounted for marginal proportions of the sample are excluded from the analysis.

identify respondents whose father has primary or secondary and higher education).[116] Moreover, while data availability is generally more restricted for historical area characteristics, it was possible to construct a set of geographic controls from the community census, including the distance to the nearest urban centre (using today's median distance in km for all municipalities in a district), as well as the proportion of municipalities in a district that report the presence of administrative or commercial buildings in the colonial period. Both of these variables are defined in relation to the district of origin for each individual (see Table 2.20, annex for descriptive statistics).[117]

Again, estimations are carried out separately for the two historical proxy variables, thus producing two sets of estimations that account, respectively, for the presence of Catholic missionary staff in 1945 (Tables 2.9 and 2.10) and the proportions of Catholics in 1977 (Tables 2.11. and 2.12).[118] To facilitate the presentation, the following discussion will only focus on coefficient estimates. Corresponding marginal effects at the cohort specific sample means are presented in Tables 2.21 to 2.24 in the annex to this chapter.

The estimation results offer again strong support for the hypothesis that the difference in educational outcomes between Christians and non-Christians overlap with more general geographic inequalities, created by the uneven outreach of past missionary activity. Across all age cohorts, Catholics and Protestants are more likely to have progressed further in school, both in terms of the level of schooling attended

---

[116] Age is included to discount for the possibility that educational outcomes are not homogeneous across birth years within each age cohort.

[117] The presence of colonial buildings was not significant in the municipal level estimations discussed in Section 5 of this chapter.

[118] Note that the proportion of Catholics in 1977 cannot be expected to have any causal effect on educational outcomes for the oldest two age cohorts, as individuals in these groups went to school before that year. However, significant values on these coefficients may indicate longer-term correlations between the presence of Christians and educational outcomes that would support my overall argument.

and the type of degree obtained. It should be noted that these coefficients may be subject to an upward bias, caused by unobserved location effects that are not captured by the diocese level controls used here. For example if Christian respondents on average grew up in areas within a diocese that had a better supply of education, the error term in the estimated model should contain a component that is correlated both with individual school achievement and a respondent's religion. On the basis of the available evidence it is fair to assume that this bias would be positive.[119] The unobserved locality effect is therefore likely to lead to over-estimations of the influence of religion on schooling choices.[120]

Even when variations between religious groups are taken into account, the two historical proxies still have a discernable influence on education outcomes. With respect to the level of schooling attended, both the historical presence of missionary staff and the historical proportion of Catholics in an area have a significant and positive effect on educational outcomes in all the age cohorts considered here (Tables 2.9. and 2.10). The only exception is the cohort between 36 and 45 years. This is actually a promising sign, as the schooling age of this cohort roughly coincides with the period of rapid school expansion in the 1960s and 1970s. It appears that the large-scale expansion of school infrastructure shortly after independence managed to at least temporarily offset underlying disadvantages in school accessibility in areas with a historically weaker presence of Christians.

---

[119] Christians tend to live in areas with better school supply. Because school supply indicators are likely to have a positive effect on school choices, the direction of the omitted variable bias should also be positive.

[120] Another form of bias would arise if there are omitted individual level characteristics that simultaneously affect educational achievements and the likelihood of being Christian. Here, I do not control explicitly for this possibility, given the lack of an appropriate instrumental variable (the variable describing the proportion of Catholics per diocese in 1977 is not sufficiently disaggregated to serve this purpose, see above).

Table 2.9. Highest level of schooling obtained (coefficient estimates, 1945 data)

	Age 16-25	Age 26-35	Age 36-45	46 or older
	School level	School level	School level	School level
Missionary staff in 1945	**0.939*****	**0.517****	**0.024**	**0.875*****
	(-0.189)	**(-0.239)**	**(-0.272)**	**(-0.252)**
Colonial infrastructure	0.184	-0.055	0.506***	-0.110
	(0.144)	(0.155)	(0.194)	(0.195)
Distance to capital	0.000***	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.069	-0.159**	-0.413***	-0.491***
	(0.052)	(0.066)	(0.076)	(0.073)
Age	-0.003	0.025**	-0.043***	-0.020***
	(0.008)	(0.012)	(0.013)	(0.004)
Catholic	0.859***	0.867***	1.091***	0.961***
	(0.074)	(0.090)	(0.101)	(0.098)
Protestant	0.841***	0.949***	1.129***	0.947***
	(0.075)	(0.091)	(0.107)	(0.100)
Father primary educ.	0.552***	0.737***	0.858***	0.755***
	(0.062)	(0.074)	(0.083)	(0.084)
Father secondary educ. or higher	1.542***	1.648***	1.547***	1.652***
	(0.095)	(0.114)	(0.169)	(0.163)
Constant 1	0.711***	1.079***	-1.086*	-0.462*
	(0.190)	(0.364)	(0.562)	(0.276)
Constant 2	2.364***	2.690***	0.548	1.136***
	(0.197)	(0.365)	(0.566)	(0.275)
Observations	2865	1754	1365	1636

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Traditional believers and fathers with no schooling are the omitted categories for the religion and parental education dummies.

Table 2.10. Highest level of schooling obtained (coefficient estimates, 1977 data)

	Age 16-25	Age 26-35	Age 36-45	46 or older
	School level	School level	School level	School level
Proportion of	**0.806***	**0.516**	**-0.109**	**0.698***
Catholics in 1977	**(0.184)**	**(0.236)**	**(0.289)**	**(0.258)**
Colonial	0.253*	0.003	0.515***	-0.030
infrastructure	(0.139)	(0.152)	(0.192)	(0.199)
Distance to capital	0.000**	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.073	-0.161**	-0.414***	-0.484***
	(0.052)	(0.066)	(0.076)	(0.073)
Age	-0.002	0.023**	-0.043***	-0.020***
	(0.008)	(0.012)	(0.013)	(0.004)
Catholic	0.855***	0.862***	1.105***	0.964***
	(0.077)	(0.092)	(0.101)	(0.100)
Protestant	0.861***	0.952***	1.146***	0.978***
	(0.076)	(0.092)	(0.107)	(0.102)
Father primary	0.552***	0.738***	0.863***	0.769***
educ.	(0.062)	(0.074)	(0.083)	(0.084)
Father secondary	1.570***	1.665***	1.551***	1.654***
educ. or higher	(0.095)	(0.113)	(0.169)	(0.161)
Constant 1	0.665***	1.020***	-1.110**	-0.496*
	(0.189)	(0.368)	(0.560)	(0.274)
Constant 2	2.315***	2.631***	0.524	1.095***
	(0.197)	(0.370)	(0.564)	(0.272)
Observations	2865	1754	1365	1636

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Traditional believers and fathers with no schooling are the omitted categories for the religion and parental education dummies.

Again, the historical proxies perform less well as a predictor for individual school graduation levels. While the historical presence of missionary staff in an area has a strong and consistent effect on individual graduations (Table 2.11), the second historical proxy (proportion of Catholics in 1977) only passes the commonly accepted significance levels for the youngest and the oldest age cohort (in the case of the older age cohort the effect is only significant at the 10% level, Table 2.12). This indicates again that differences in school quality are less accurately explained by the historical processes that these two variables intend to capture.

Table 2.11. Highest degree obtained (coefficient estimates, 1945 data)

	Age 16-25	Age 26-35	Age 36-45	46 or older
	degree	degree	degree	degree
Missionary staff in	**1.325***	**0.833***	**0.551****	**0.668****
1945	**(0.209)**	**(0.249)**	**(0.280)**	**(0.324)**
Colonial	0.408**	0.089	0.625***	0.439*
infrastructure	(0.170)	(0.171)	(0.217)	(0.243)
Distance to capital	0.000***	0.000	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.026	-0.209***	-0.350***	-0.634***
	(0.064)	(0.076)	(0.090)	(0.100)
Age	0.016	0.032**	-0.053***	-0.017***
	(0.010)	(0.013)	(0.016)	(0.006)
Catholic	0.775***	0.738***	1.144***	0.859***
	(0.102)	(0.116)	(0.153)	(0.150)
Protestant	0.666***	0.844***	1.181***	0.879***
	(0.103)	(0.113)	(0.154)	(0.154)
Father primary educ.	0.310***	0.622***	0.610***	0.730***
	(0.082)	(0.093)	(0.099)	(0.108)
Father secondary	1.432***	1.572***	1.535***	1.652***
educ. or higher	(0.092)	(0.113)	(0.133)	(0.146)
Constant 1	2.692***	2.768***	0.134	1.261***
	(0.244)	(0.440)	(0.684)	(0.392)
Constant 2	3.599***	3.650***	0.861	1.943***
	(0.247)	(0.449)	(0.683)	(0.391)
Observations	2754	1709	1335	1576

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Traditional believers and fathers with no schooling are the omitted categories for the religion and parental education dummies.

Table 2.12. Highest degree obtained (coefficient estimates, 1977 data)

	Age 16-25	Age 26-35	Age 36-45	46 or older
	degree	degree	degree	degree
Proportion of	0.462**	0.144	0.248	0.568*
Catholics in 1977	(0.206)	(0.256)	(0.306)	(0.308)
Colonial	0.571***	0.215	0.692***	0.507**
infrastructure	(0.164)	(0.169)	(0.216)	(0.245)
Distance to capital	0.000***	0.000	0.000**	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.033	-0.212***	-0.333***	-0.628***
	(0.064)	(0.076)	(0.091)	(0.099)
Age	0.018*	0.030**	-0.052***	-0.017***
	(0.010)	(0.013)	(0.016)	(0.006)
Catholic	0.844***	0.807***	1.172***	0.860***
	(0.102)	(0.115)	(0.152)	(0.151)
Protestant	0.786***	0.933***	1.218***	0.900***
	(0.102)	(0.114)	(0.154)	(0.154)
Father primary educ.	0.338***	0.658***	0.624***	0.738***
	(0.081)	(0.092)	(0.099)	(0.107)
Father secondary	1.469***	1.603***	1.542***	1.653***
educ. or higher	(0.091)	(0.112)	(0.132)	(0.147)
Constant 1	2.565***	2.616***	0.108	1.228***
	(0.243)	(0.444)	(0.681)	(0.388)
Constant 2	3.456***	3.492***	0.834	1.909***
	(0.246)	(0.453)	(0.680)	(0.385)
Observations	2754	1709	1335	1576

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Traditional believers and fathers with no schooling are the omitted categories for the religion and parental education dummies.

It is also worth considering the effect of some of the other control variables. As can be expected, father's education is a strong and consistent determinant of individual school achievements. In particular, the effect of the dummy to identify fathers with secondary or higher education dominates over all other parameters in the model. Distance to the nearest urban centre has a significant though small effect in the youngest age cohort and in the two oldest cohorts in the degree model. The existence of colonial infrastructure in the place of origin of a respondent only has a relatively consistent impact in the school degree model. Interestingly, the effect of this variable is particularly marked in the one age cohort (36-45) whose educational

outcomes are not visibly influenced by the historical presence of Christians. Following my interpretation above, this may indicate that school investments shortly after independence disproportionally benefited communities that already received investments in colonial times.[121] Finally, while school attendance and graduation levels are significantly lower for females in the older age cohorts, these differences largely disappear in the younger age groups. This supports earlier evidence that Madagascar, unlike many other comparable developing countries, has largely managed to eradicate the gender gap in education (see for example Glick / Sahn 2006, World Bank 2002: 49f).

These findings are generally consistent with the hypothesis of this chapter that educational inequalities between religious groups in Madagascar have a spatial undercurrent that is related to uneven levels of missionary activity in the 19th century. Even for Christians, the fact of being born into a region with a lower historical presence of missionaries and Christians significantly reduces the probability of progressing further in school, compared to adherents of the major Christian confession in other parts of a country that were under stronger historical influence by the Christian church.

Another important finding is the relative persistence of these inequalities across the different age cohorts itself. Over time, and with only few exceptions, Christians and other inhabitants of predominately Christian areas have had persistently higher educational achievements than non-Christians. This finding is consistent with the argument put forward in this chapter that historical inequalities in school provision have created differences in group and locations specific rates of human capital accumulation that explain in themselves a part of the persistence of educational inequalities in Madagascar. At the same time, the results presented here

---

[121] Note however, that this variable is measured at lower levels of spatial aggregation than the two historical proxies. This means that the effects of missionary activity and colonial investments cannot be completely distinguished under the analytical framework used here.

may offer some indication as to why one observes significantly lower demand for schooling in the mostly non-Christian areas. If it can be assumed that parents who are themselves less educated (and who come from families with traditionally lower levels of schooling) are less likely to invest in the education of their children, uneven educational outcomes between groups and regions should be expected to persist over generations. However, under this explanation the origin of lower educational outcomes observed among non-Christians today still lies in the historical under-provision of modern education to this group. Fundamental cultural differences in educational preferences between Christians and non-Christians are a less likely determinant.

2.8 Private schooling and inequality in the current school age cohort

In analyzing outcomes in the current age cohort, it is important to take into account the important role private and particularly religious providers continue to play in the Malagasy education sector. Following the sharp contraction in public education spending throughout the 1990s and parts of the last decade, private providers account for about a quarter of all primary schools and a fifth of all primary school enrolments in the island. About half of these schools are operated by religious providers, most of which are associated with the Catholic Church (World Bank 2002: 11f, FN 3).

Private and religious schools operate under the public primary education curriculum and are formally required to take on students of all religious confessions. However, they may contribute to lower enrolments among children of non-Christian families through a number of mechanisms that need to be carefully distinguished. For example, private schools collect, on average, higher fees than their public sector equivalents. Naturally, this may particularly discourage children of traditional

believers, who tend to be among the poorest and least educated members of Malagasy society.

In addition, inequalities in enrolments may be influenced by differences in the quality and accessibility of private schools. As in most other countries, private schools in Madagascar generally provide higher quality education and are better equipped and staffed than their public sector equivalents. This enables them to offer the full primary cycle and to avoid less efficient teaching practices such as multi-grade teaching. Anecdotal evidence and previous research suggest that these quality differentials often create an incentive for parents who may not otherwise do so to enrol their children in primary school.[122] For example Glick and Sahn (2006) show that multi-grade teaching and poor building conditions, which are common characteristics of public facilities, act as a strong deterrent for parent's enrolment decisions, even when controlling for other relevant attributes at the individual or school level.

These added incentives for private schooling interact with the spatial inequalities discussed earlier in this chapter, because most private schools continue to be concentrated in predominantly Christian areas with historically higher levels of school supply. For example, the aforementioned review of the education system by the World Bank (2002) reports that while close to four-fifths of private schools were located in rural areas, about 63% were concentrated in the province of Antananarivo and another 19% in the southern highlands of the province Fianarantsoa (the remainder were located more or less evenly in the four coastal and southern

---

[122] Most importantly, the offer of the full primary cycle opens the opportunity to graduate from primary school and to pursue secondary or higher levels of schooling (World Bank 2002, Glick /Sahn 2006). Moreover, previous assessments of the private education system find much lower drop out and repetition rates than in the public sector, while test scores in key subjects such as mathematics and French are generally higher (Arestoff / Bommier 1999; World Bank 2002:83; both studies control for observed teacher and student characteristics). Of course, it is also possible that private school providers discriminate informally against non-Christians, or that Christian households are under particular pressure from their local religious authorities to send their children to the schools that are locally operated by their church.

provinces of the island, which have traditionally lower shares of Christian inhabitants; see World Bank 2002: 63). These imbalances in the distribution of private facilities not only reinforce existing inequalities in the primary school network, but may also contribute to lower education demand in the historically more disadvantaged regions of Madagascar.

Preliminary evidence from the household survey used here provides strong indications that private education indeed contributes to the observed interreligious inequalities in educational achievements. Descriptive statistics reported in Table 2.1 earlier in this chapter indicate that while traditional believers also have lower enrolments rates in public schools (35.5 % compared to 47.4% and 57% for Catholics and Protestants, respectively), differences are much more significant in the private sector: only about 3.3% of all children from traditional believers in the relevant age cohort are enrolled in private schools, as opposed to 23.3% among children from Catholic households and 18.6% in Protestant households (see Table 2.1, above). In addition, there are strong signs of the described geographic inequalities in the distribution of private schools. For instance, again using the present-day proportion of traditional believers to split the sample, I find that out of almost 700 children in communities with a majority of non-Christian households, fewer than 10 students are enrolled in a private facility (see also Table 2.2. for additional evidence on the very uneven geographic distribution of private schools). Combined with the available information on private school placement, this suggests that private education is significantly less accessible for traditional believers than to the Christian population.

The apparent importance of private school provision for the observed interreligious inequalities in education poses some challenges for the analysis of enrolment decisions in the current age cohort. For example, common covariates of religious status, such as poverty or educational background of a child's parents, may

influence enrolment choices in different ways across public and private schools. At the same time, it is important to account for more systematic variations in education demand that may be brought about by the very uneven geographic distribution of private facilities.

The following analysis deals with these challenges in two ways. First, I address differences in contemporary school demand in a discrete choice framework that allows for separately assessing how household and school-specific attributes influence enrolment decisions across different school types. Where private providers are available, parental demand for education is thus modelled as choice between three alternative outcomes: no enrolment, public enrolment and private school enrolment. Moreover, in contrast to most previous provider choice studies, this analysis relies on a relatively infrequently used estimation technique that is more flexible with respect to possible interactions between different school alternatives— namely the multinomial probit model (see Long / Freese 2006: 313ff). While more widely employed estimation procedures, such as the conditional or nested logit model, impose restrictions on the correlation matrix between the error terms of alternative choice functions, the multinomial probit model allows for correlations across all alternative outcomes.[123] This is a useful feature in the context of this study, as it helps to account for the potentially special role private school providers play in the enrolment decisions of Malagasy households. For example, under the estimation procedure used here it is possible that both the private and public school choice are

---

[123] This relates to the so-called assumption of independence of irrelevant alternatives (IIA). Intuitively, IIA implies that the choice of a specific option is not affected by other alternatives available to the decision maker—an assumption that evidently may not make sense here if the choice of enrolment or non-enrolment depends directly on the type of school available. Unlike the conditional logit model, the nested logit model allows for relaxing the assumption of IIA for similar choices in a multiple level decision tree (a commonly used nesting structure would contrast public or private school choices to the non-enrolment alternative (see for example Glick /Sahn 2006). Here I do not use the nested logit model because—as I argue shortly—it is not always evident that private and public school choices in Madagascar can be nested in the same decision process. In this setting the multinomial probit model offers a more conservative solution, as it allows for correlation between the error terms of each of the three alternatives.

'nested' within a broader preference for schooling. However, it is equally possible that parents treat private schooling as a fully independent alternative that is unrelated to the availability of other inferior school types.

What this analysis fails to do is to address fundamental differences in the decision process of parents that are brought about by the uneven accessibility of private schools. For example, some parents who may choose to enrol their children in primary school in areas where private facilities are available may not do so if they only have the option of a public school, given the considerable quality differential between public and private schools. These specific decision situations, and their interaction with religion and other relevant household attributes, is likely to be lost if the analysis is carried out across the full sample, regardless of which estimation procedure is used.[124]

In this analysis I deal with this problem in a second step, by dividing the sample into households that have private schools in their vicinity and others that do not (in the latter sub-sample the estimation model reverts to the standard probit method with a choice only between no enrolment and public school attendance).[125] While this breakdown is partially endogenous to the distribution of religious groups in the country, the resulting sub-samples still have sufficiently large numbers of individuals belonging to the minority religion to allow for the estimation of parameters on the respective religious dummies. The sample with private schools (N=1,634) contains 17% of traditional believers, while the sample with no private schools (N=918) still has about 53% of Christians, with a slightly larger share of Protestants.

---

[124] Note that the computation of the multinomial probit model does not require that all households in the sample have access to the same set of alternatives. As a consequence, the same model can in principle be applied to households that have access to private schools and others that do not. However, this feature of the model does not address the more conceptual concerns raised here.

[125] The binary dependent variable in this case takes the value of 1 if a child is in school and 0 otherwise.

The primary data source used in the household level analysis is again the 2001 national household survey. In addition to reporting educational attainments of older individuals, the survey provides detailed information for each child in the schooling age in the household, such as the grade and type of school visited, school distance and fees. However, like many other multipurpose surveys the EPM does not collect data on the schools available in the village, nor does it allow for linking individual children to a specific school visited. In the following I deal with this shortcoming by complementing the household survey with administrative school data available from the community census. This allows me to account directly for the availability of private schools in a respondent's municipality (unfortunately the data do not allow to distinguish whether these schools are church-operated or where they are located within a municipality). Moreover, as in the previous geographic regressions, these data provide controls on public local education supply and school quality, as well as a number of variables on the accessibility and economic development of a community (see below).

In addition, two variables, relating to school fees and the average distance to local public and private primary schools, were constructed from the household survey. More specifically, these variables represent the sampling-cluster median for each school type reported by households in the community. However, it is important to emphasize that this procedure makes these variables endogenous to local school choices, thus rendering these controls less reliable than the other, exogenous, school access indicators included in the following regressions (see Table 2.25 in the annex to this chapter for descriptive statistics).[126]

---

[126] Intuitively, this problem arises because information on prices and school distance will only be available for the schools chosen by local households but not for those that are not visited by any children in the sample. This makes it difficult to evaluate the full range of schooling options available to local families. Another consequence of the endogenous nature of the two variables is that communities with particularly low enrolment rates had to be dropped from the sample, thus again introducing the possibility of sample selection bias into the estimation. Unfortunately, the survey data

The population analysed in this chapter are children between six and 12 years old who have not yet graduated from primary school.[127] The analysis again excludes individuals belonging to smaller religious groups as well as those living in urban centres—the latter to discount more systematic differences in education demand between urban and rural areas.

The starting point for my analysis is the standard human capital model of school choice, referred to in the theoretical introduction to this chapter. School choices are modelled by the following utility function,

$$U_{ij} = R_i \gamma_j + X_i \beta_j + Z_{ij} \alpha + c + \varepsilon_{ij}, \tag{3}$$

where U_{ij} represents the utility valuation that individual i ($i=1, 2,...,N$) makes for alternative j (1=no school; 2=public school; 3=private school), R stands for the religion of the household head for child i, measured again by dummies for Catholic and Protestant / Lutheran religion (thus treating non-Christians as the reference category), X stands for a vector of individual and community-specific characteristics such as gender, household expenditure or local school supply, Z for a vector of alternative-specific characteristics including the estimated distance and level of school fees for each school alternative, and the γ, β and α are the coefficients to be estimated for these right-hand side variables (as can be seen from the suffixes, only

---

and estimation procedures used here do not lend themselves to the same formal controls for selection bias as the regressions above. However, considering the evidence presented so far, it does not seem that a possible bias would render the following estimation results invalid. It is fair to assume that enrolment rates are particularly low in communities with a predominantly non-Christian population. The omission of such communities from the sample should weaken any estimated relation between religious status and school choices, but it should not amplify it. As such the following estimations probably represents a lower bound of the effect under investigation, while the presence of an upward bias appears less likely.

[127] This age range is wider than the official primary schooling age (six to 10 years). However, due to the high incidence of grade repetition it reflects the primary school population more accurately.

the coefficients for household are allowed to vary by alternative). The ε_{ij} are the error terms for each choice alternative and individual.

In the basic estimation specification I only control for school and household characteristics that, while possibly correlated with religious status of the household, can be expected to influence educational choices in their own right. This model includes on the right-hand side the estimated distance to and fees of public and private schools, a gender identifier for girls, controls for father's and mother's educational background and the total number of children in the schooling age in the household. Household income is approximated through a vector of indicator variables that identify whether the household falls into the second, third or fourth expenditure quartile, following a proposal by Glick and Sahn (2006) who use a similar specification for a study of school demand based on earlier rounds of survey data for Madagascar.[128] Finally, this model also includes information on the proportion of private primary schools in the municipality in order to account for the apparent variability of private school supply in the sample. Marginal effects and standard errors at the sample mean are reported on the left-hand side (columns 2 and 3) of Tables 2.13a-c below (see Table 2.26 in the annex of this chapter for the coefficient estimates).

Similar to the previous estimations for older age cohorts, it should be expected that the coefficients of the religion identifiers in this model capture unobserved location effects. For example, because levels of school supply and quality are unevenly distributed across predominantly Christian and non-Christian areas in Madagascar, the error term in each estimated utility function is likely to contain an 'education supply effect' correlated both with school choice and the

---

[128] A more common solution would have been to estimate income effects through a polynomial of household expenditure. In this analysis I use expenditure quartiles both because this permits a more intuitive interpretation of changes in school demand across the income distribution and because income quartiles are less affected by problems of colinearity when combined with community level controls at the later stages of my analysis.

religion of the household head. On the basis of the available evidence it is fair to assume that this bias should be again be positive.[129] It should therefore be expected that the failure to account for this locality effect would lead to an over-estimation of the influence of religion on schooling choices.[130]

The typical solution to deal with this problem would be to estimate a model that incorporates locality-specific fixed effects (in other words to add a dummy for each locality in the sample). However, with a choice model with three alternatives and a sample that covers over 200 municipalities, such a procedure is unfortunately not feasible in the present context. With the data available for this study, the most practicable solution is to control directly for observed community characteristics that could be expected to influence school choices. In the following analysis these controls are made up of a similar set of community characteristics and school access indicators as in the geographic regressions above. These include the current and historical proportion of traditional believers and Christians in an area, the dry season travel time from the municipality to the nearest urban centre, the number of primary schools per 1,000 inhabitants, student-teacher ratios in public primary schools and a dummy for the presence of a secondary school in the municipality. Marginal effects and standard errors at the sample mean are presented on the right hand side (columns 3 and 4) of Table 2.13a-c (the coefficient estimates are reported in Table 2.26 in the annex).

---

[129] Christians tend to live in areas with better school supply. Because school supply indicators are likely to have a positive effect on school choices, the direction of the omitted variable bias should also be positive.
[130] Another form of bias would arise if omitted individual level characteristics simultaneously affect the likelihood of being Christian and of enrolling children in a local primary school. Here, I do not control explicitly for this possibility, given the lack of an appropriate instrumental variable (the variable describing the proportion of Catholics per diocese in 1977 does not have sufficient local variation to serve this purpose, see above) and the fact that religion appears to be a historical constant, rather than a personal choice, for most households in Madagascar.

Table 2.13a. Probability of non-enrolment and marginal effects, pooled sample

No school	Prob. of non enrolment	0.247		0.254	
		(1)	**(2)**	**(3)**	**(4)**	**(5)**
Variable		dp/dx	Std. Err.	dp/dx	Std. Err.	X
Distance (km)						
Public school		0.053	(0.043)	0.063	(0.052)	0.579
Private school		0.027***	(0.011)	0.025**	(0.010)	0.915
Fees						
Public school		1.26e-04	(1.67e-04)	1.18e-04	(1.76e-04)	6.856
Private school		6.50e-05	(6.2e-05)	4.60e-05	(5.30e-05)	57.950
Household and community variables						
Catholic		**-0.138*****	**(0.042)**	**-0.096***	**(0.050)**	**0.350**
Protestant		**-0.181*****	**(0.037)**	**-0.140*****	**(0.044)**	**0.377**
2cd exp quartile		-0.097***	(0.028)	-0.100***	(0.027)	0.289
3rd exp quartile		-0.118***	(0.031)	-0.124***	(0.032)	0.165
4th exp quartile		-0.089	(0.060)	-0.108*	(0.059)	0.048
Father prim education		-0.059*	(0.031)	-0.050	(0.032)	0.447
Father sec education		-0.127***	(0.041)	-0.127***	(0.042)	0.321
Mother prim education		-0.124***	(0.032)	-0.114***	(0.033)	0.477
Mother sec education		-0.199***	(0.037)	-0.192***	(0.038)	0.230
Female		-0.009	(0.021)	-0.008	(0.021)	0.495
N of children in schooling age		0.009	(0.011)	0.008	(0.011)	2.187
Prop of private schools		0.103*	(0.062)	0.131**	(0.066)	0.240
Prop of Non-Christians				0.082	(0.083)	0.255
Prop Catholics 1977				-0.079	(0.118)	0.188
Stdnt. teacher ratio				0.000	(0.000)	58.240
Schools per 1000 inhabitants				-0.019	(0.027)	0.874
Secondary school in munic.				0.004	(0.040)	0.820
Travel time to urban centre				0.001	(0.001)	11.792

Columns 1 and 2 report the marginal effects estimates. Column 5 the variable mean. Marginal effects are estimated at the sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: (F[12, 173] =0.89, Prob > F = 0.5544.

Table 2.13b. Probability of public school enrolment and marginal effects, pooled sample

Public school	Prob. of enrolment	0.437		0.427	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Variable	dp/dx	Std. Err.	dp/dx	Std. Err.	X
Distance (km)					
Public school	-0.098**	(0.047)	-0.113**	(0.056)	0.579
Private school	0.045***	(0.016)	0.050***	(0.019)	0.915
Fees					
Public school	-2.33e-04	(2.48e-04)	-2.12e-04	(2.64e-04)	6.856
Private school	1.07e-04	(9.60e-05)	9.4e-05	(1.01e-04)	57.950
Household and community variables					
Catholic	**-0.028**	**(0.057)**	**-0.098**	**(0.079)**	**0.350**
Protestant	**0.049**	**(0.060)**	**-0.015**	**(0.079)**	**0.377**
2cd exp quartile	0.018	(0.043)	0.012	(0.047)	0.289
3rd exp quartile	-0.050	(0.054)	-0.060	(0.061)	0.165
4th exp quartile	-0.215***	(0.069)	-0.222***	(0.080)	0.048
Father prim education	0.054	(0.047)	0.031	(0.051)	0.447
Father sec education	0.010	(0.064)	-0.013	(0.065)	0.321
Mother prim education	0.146***	(0.045)	0.139***	(0.049)	0.477
Mother sec education	0.184***	(0.063)	0.181***	(0.067)	0.230
Female	0.003	(0.023)	0.001	(0.024)	0.495
N of children in schooling age	-0.024	(0.016)	-0.022	(0.016)	2.187
Prop of private schools	-0.157*	(0.087)	-0.155	(0.096)	0.240
Prop of Non-Christians			-0.157	(0.136)	0.255
Prop Catholics 1977			-0.055	(0.158)	0.188
Stdnt. teacher ratio			0.000	(0.000)	58.240
Schools per 1000 inhabitants			0.031	(0.028)	0.874
Secondary school in munic.			0.035	(0.058)	0.820
Travel time to urban centre			0.000	(0.002)	11.792

Columns 1 and 2 report the marginal effects estimates. Column 5 the variable mean. Marginal effects are estimated at the sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: (F[12, 173] =0.89, Prob > F = 0.5544.

Table 2.13c. Probability of private school enrolment and marginal effects, pooled sample

Private school	Prob. of enrolment	0.315		0.319	
		(1)	**(2)**	**(3)**	**(4)**	**(5)**
Variable		dp/dx	Std. Err.	dp/dx	Std. Err.	X
Distance (km)						
Public school		0.045***	(0.016)	0.050***	(0.019)	0.579
Private school		-0.072***	(0.025)	-0.075***	(0.027)	0.915
Fees						
Public school		1.07e-04	(9.60e-05)	9.40e-05	(1.01e-04)	6.856
Private school		-1.73e-04	(1.56e-04(	-1.41e-04	(1.53e-04)	57.950
Household and community variables						
Catholic		**0.166****	**0.080**	**0.194***	**(0.114)**	**0.350**
Protestant		**0.132***	**0.076**	**0.155**	**(0.108)**	**0.377**
2cd exp quartile		0.079	0.052	0.088	(0.057)	0.289
3rd exp quartile		0.168***	0.065	0.183***	(0.074)	0.165
4th exp quartile		0.305***	0.102	0.330***	(0.117)	0.048
Father prim education		0.005	0.055	0.019	(0.058)	0.447
Father sec education		0.117*	0.070	0.140*	(0.074)	0.321
Mother prim education		-0.022	0.053	-0.025	(0.057)	0.477
Mother sec education		0.015	0.069	0.011	(0.072)	0.230
Female		0.005	0.026	0.007	(0.026)	0.495
N of children in schooling age		0.015	0.019	0.015	(0.019)	2.187
Prop of private schools		0.054	0.090	0.024	(0.108)	0.240
Prop of Non-Christians				0.075	(0.185)	0.255
Prop Catholics 1977				0.133	(0.161)	0.188
Stdnt. teacher ratio				0.000	(0.001)	58.240
Schools per 1000 inhabitants				-0.012	(0.024)	0.874
Secondary school in munic.				-0.039	(0.063)	0.820
Travel time to urban centre				-0.001	(0.002)	11.792

Columns 1 and 2 report the marginal effects estimates. Column 5 the variable mean. Marginal effects are estimated at the sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: (F[12, 173] =0.89, Prob > F = 0.5544.

Turning first to the more parsimonious model, the estimation results suggest that even within communities, distance to schools is a strong deterrent for educational choices. For instance, the probability of enrolment decreases by almost 10% for public schools and by 7% for private schools with every additional kilometre to the facility. Moreover, as can be expected, a larger share of private schools in a municipality reduces the likelihood of public school attendance. At the sample mean, every percentage increase in the local proportion of private schools reduces the likelihood of public school enrolment by over 15%.

While the level of school fees does not appear to have a discernable effect on school choices,[131] household income clearly matters. Looking first at the non-school alternative I find that, at the sample mean, children from households in the middle and higher income quartiles are less likely to be out of school than children in the poorest 25% of the population.[132] It appears that this link from income to school choice works primarily via the private school option. For example, the probability of being enrolled in public primary schools is not statistically different for children in the poorest and middle expenditure quartiles. The only exception is the highest income group, where children have a lower probability of being in public primary schools than children from the poorest quartile. On the other hand, in the private school alternative, every jump from one expenditure quartile to the next roughly doubles the probability of choosing a private school. This suggests that higher income earners in Madagascar have largely deserted the public primary schooling system in favour of higher quality private education.

---

[131] However, this may be due to the endogenous nature of this variable.
[132] The effect of the highest income quartile is not statistically different from zero, but this maybe due to the generous definition of the schooling age in this study. In fact, by extending the schooling age to 12 years I may exclude a sizeable proportion of children from better off families who passed through primary schools more quickly.

145

Parental education background also influences schooling decisions and, as is often the case, this effect tends to be stronger on the mother's side. A child whose mother has secondary education or higher is almost 20% more likely to be enrolled than a child whose mother has no education. The effect of father's education on the probability of enrolment is less marked, and it has no visible impact on the likelihood of public school attendance. However, this result may be due to co-linearity with other independent variables and the effect is reversed in the private school option, where only fathers' secondary education appears to influence enrolment probabilities. The gender dummy identifying the sex of the child is negligible and statistically insignificant, again corroborating existing evidence that gender inequality of schooling is general not an issue in the Malagasy education system.

Even when these household-level determinants are taken into account, considerable differences remain in private school enrolments across religious groups. At the sample mean, children of Catholic and Protestant parents have a respective probability of private school enrolment that is between 16% and 13% higher than that of traditional believers. Outcomes on the other two alternatives suggest that this difference in private school enrolments accounts almost entirely for the difference in overall school enrolment rates. For example, while Catholics and Protestants are on average 15% more likely to be enrolled in primary school than their peers from non-Christian households, there are no significant differences in enrolment probabilities in the public school alternative.

The community-level controls introduced in the more complex model specification generally do not have a statistically discernable impact on schooling decisions.[133] The only exception is the local proportion of non-Christians, which has a mildly negative effect on the probability of public primary school enrolment (see

---

[133] A Wald test confirmed that the community controls added in the model are not jointly statistically significant ($F[12, 173] = 0.89$).

Table 2.26 in the annex). Yet, as was hypothesized, the inclusion of these variables does have a considerable effect on the two religion identifiers. For example the coefficient of the Catholic dummy in the public school option decreases by over 50%, and it ceases to be statistically significant in both school options. The parameter estimate of Protestants in the public school alternative remains statistically significant but it is also reduced by about a third. Interestingly, the coefficients for both religious groups increase slightly in the private school option, but none of these estimates passes the usual significance tests. It is not entirely clear however, whether these results are just due to the additional noise introduced by the inclusion of the community controls or whether they indicate a genuine location bias in the religion effects estimated under the more parsimonious model.

For the reasons outlined above, the pooled sample regressions may give an unrealistic impression of the determinants of enrolment decisions because they do not deal with possible differences in parental choice functions in areas without private schools. A more realistic picture may emerge from the separate sub-sample regressions that account directly for differences in private school availability.

The estimates from the sub-sample with private schools largely reflect the trends and significance levels from the pooled sample (Table 2.14a-c. See Table 2.27 in the annex for the coefficient estimates). For example at the household level, income and particularly mother's education continue to be relatively robust predictors of school choices. The proportion of non-Christians in a community still has a mildly significant negative effect on public school enrolments, while the distance to the nearest urban centre is associated with lower probabilities of both public and private school enrolment.

Table 2.14a. Probability of non-enrolment and marginal effects, sub-sample with private schools

No school	Prob. of non enrolment	0.237		0.250		
		(1)	**(2)**	**(3)**	**(4)**	**(5)**
Variable		dp/dx	Std. Err.	dp/dx	Std. Err.	X
Distance (km)						
Public school		0.032	(0.025)	0.035	(0.030)	0.621
Private school		0.019*	(0.011)	0.015	(0.009)	0.939
Fees						
Public school		1.07e-04	(1.26e-04)	3.20e-05	(9.30e-05)	7.068
Private school		6.50e-05	(5.50e-05)	1.30e-05	(3.60e-05)	63.584
Household and community variables						
Catholic		**-0.202*****	**(0.041)**	**-0.135*****	**(0.051)**	**0.395**
Protestant		**-0.253*****	**(0.039)**	**-0.183*****	**(0.047)**	**0.401**
2cd exp quartile		-0.111***	(0.031)	-0.114***	(0.030)	0.296
3rd exp quartile		-0.127***	(0.031)	-0.132***	(0.031)	0.183
4th exp quartile		-0.058	(0.054)	-0.081	(0.049)	0.066
Father prim education		-0.080**	(0.041)	-0.055	(0.042)	0.424
Father sec education		-0.156***	(0.049)	-0.138***	(0.050)	0.376
Mother prim education		-0.138***	(0.042)	-0.119***	(0.042)	0.463
Mother sec education		-0.206***	(0.044)	-0.199***	(0.043)	0.289
Female		-0.013	(0.025)	-0.012	(0.025)	0.496
N of children in schooling age		0.006	(0.014)	0.005	(0.013)	2.178
Prop of private schools		0.061	(0.075)	0.027	(0.080)	0.358
Prop of Non-Christians				0.067	(0.117)	0.178
Prop Catholics 1977				-0.004	(0.121)	0.222
Stdnt. teacher ratio				0.000	(0.000)	52.794
Schools per 1000 inhabitants				-0.034	(0.026)	0.843
Secondary school in munic.				-0.028	(0.052)	0.944
Travel time to urban centre				0.003***	(0.001)	8.736

Columns 1 and 2 report the marginal effects estimates. Column 5 the variable mean. Marginal effects are estimated at the sub-sample mean. Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: $F(12,118) = 1.84$, Prob $> F = 0.0489$.

Table 2.14b. Probability of public school enrolment and marginal effects, sub-sample with private schools

Public school	Prob. of enrolment	0.421		0.389	
		(1)	(2)	(3)	(4)	(5)
Variable		dp/dx	Std. Err.	dp/dx	Std. Err.	X
Distance (km)						
Public school		-0.069*	(0.036)	-0.085**	(0.039)	0.621
Private school		0.037*	(0.020)	0.050**	(0.025)	0.939
Fees						
Public school		-2.29e-04	(2.09e-04)	-7.60e-05	(2.06e-04)	7.068
Private school		1.22e-04	(9.80e-05)	4.50e-05	(1.16e-04)	63.584
Household and community variables						
Catholic		**-0.139****	**(0.070)**	**-0.263****	**(0.080)**	**0.395**
Protestant		**-0.043**	**(0.075)**	**-0.165***	**(0.085)**	**0.401**
2cd exp quartile		0.036	(0.054)	0.018	(0.058)	0.296
3rd exp quartile		-0.054	(0.061)	-0.076	(0.069)	0.183
4th exp quartile		-0.221***	(0.076)	-0.241***	(0.079)	0.066
Father prim education		0.031	(0.062)	-0.017	(0.070)	0.424
Father sec education		-0.015	(0.077)	-0.073	(0.083)	0.376
Mother prim education		0.216***	(0.055)	0.203***	(0.064)	0.463
Mother sec education		0.253***	(0.072)	0.247***	(0.080)	0.289
Female		0.004	(0.029)	0.000	(0.031)	0.496
N of children in schooling age		-0.005	(0.019)	-0.006	(0.019)	2.178
Prop of private schools		-0.161	(0.112)	-0.081	(0.110)	0.358
Prop of Non-Christians				-0.526**	(0.234)	0.178
Prop Catholics 1977				-0.125	(0.178)	0.222
Stdnt. teacher ratio				0.000	(0.001)	52.794
Schools per 1000 inhabitants				0.037	(0.029)	0.843
Secondary school in munic.				0.084	(0.091)	0.944
Travel time to urban centre				0.002	(0.002)	8.736

Columns 1 and 2 report the marginal effects estimates. Column 5 the variable mean. Marginal effects are estimated at the sub-sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: F(12,118) = 1.84, Prob > F = 0.0489.

Table 2.14c. Probability of private school enrolment and marginal effects, sub-sample with private schools

Private school	Prob. of enrolment	0.341		0.361		
		(1)	**(2)**	**(3)**	**(4)**	**(5)**
Variable		dp/dx	Std. Err.	dp/dx	Std. Err.	X
Distance (km)						
Public school		0.037*	(0.020)	0.050**	(0.025)	0.621
Private school		-0.056*	(0.029)	-0.065**	(0.030)	0.939
Fees						
Public school		1.22e-04	(9.80e-05)	4.50e-05	(1.16e-04)	7.068
Private school		-1.87e-04	(1.50e-04)	-5.80e-05	(1.52e-04)	63.584
Household and community variables						
Catholic		**0.341*****	**(0.084)**	**0.398*****	**(0.106)**	**0.395**
Protestant		**0.296*****	**(0.083)**	**0.349*****	**(0.107)**	**0.401**
2cd exp quartile		0.076	(0.057)	0.096	(0.060)	0.296
3rd exp quartile		0.181***	(0.064)	0.208***	(0.072)	0.183
4th exp quartile		0.279***	(0.091)	0.322***	(0.094)	0.066
Father prim education		0.049	(0.064)	0.072	(0.074)	0.424
Father sec education		0.171**	(0.079)	0.211***	(0.088)	0.376
Mother prim education		-0.079	(0.058)	-0.084	(0.068)	0.463
Mother sec education		-0.046	(0.070)	-0.048	(0.079)	0.289
Female		0.009	(0.030)	0.012	(0.031)	0.496
N of children in schooling age		-0.002	(0.020)	0.001	(0.020)	2.178
Prop of private schools		0.100	(0.120)	0.055	(0.120)	0.358
Prop of Non-Christians				0.459	(0.284)	0.178
Prop Catholics 1977				0.129	(0.186)	0.222
Stdnt. teacher ratio				-0.001	(0.001)	52.794
Schools per 1000 inhabitants				-0.003	(0.025)	0.843
Secondary school in munic.				-0.056	(0.079)	0.944
Travel time to urban centre				-0.005***	(0.002)	8.736

Columns 1 and 2 report the marginal effects estimates. Column 5 the variable mean. Marginal effects are estimated at the sub-sample mean. Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: $F(12,118) = 1.84$, Prob > F = 0.0489.

More importantly for my current question, the exclusion of communities with no private schools also brings out more clearly the differences in enrolment trends between religious groups. Catholics and Protestants have considerably lower probabilities of non-enrolment than children of traditional believers (the relative differences are 20% and 25%, respectively, when no community controls are included). In this part of the sample Christians are also less likely to be enrolled in public schools; an effect which is accentuated when community controls are added to the estimation. With these controls, the respective likelihoods of public school enrolment for Catholics and Protestants are 26% and 17% lower than those of traditional believers.[134] Again these differences are primarily driven by much higher probabilities of private school enrolment. In the less parsimonious model Catholics and Protestants have a probability of private school enrolment that is between 40 and 35% higher than that of children of traditional believers. This again provides a strong indication that the Christian population disproportionately benefits from the provision of additional private schooling, especially when other community characteristics are taken into account.

The results of the sub-sample from communities with no private schools confirm the particular role private school providers play for the Christian student population (Table 2.15). When there are no private schools in the vicinity, again only the Protestant student population has a significantly larger probability of enrolment. However, this effect also loses statistical significance and it is greatly reduced when community controls are included. The reason for this change in the estimated effects of religion again appears to be primarily related to structural differences between predominantly Christian and non-Christian areas. Of the geographic control variables, only the proxy for the historical presence of Christians has a statistically significant impact. As argued above, this variable is likely to be correlated with the

---

[134] In this sub-sample the local proportion of non-Christians and the travel time to the nearest urban centre have a significant impact on enrolment decisions.

religious status of a household and it may capture aggregate variations in school demand and quality that are not picked up by the other controls used here (the coefficient for Protestants remained statically insignificant when non-significant community controls were gradually excluded from the estimation. In these simpler models the effect of the proportion of non-Christians became significant at the 0.05% level).

Table 2.15. Education demand, sub-sample of communities with no private schools

	(1)	(2)	(3)	(4)
	Coefficient	dp/dx	Coefficient	dp/dx
Distance to school	-0.261***	-0.103***	-0.339***	-0.134***
	(0.070)	(0.027)	(0.091)	(0.036)
school fees	-0.021***	-0.008***	-0.028***	-0.011***
	(0.005)	(0.002)	(0.010)	(0.004)
Catholic	**0.284**	**0.110**	**-0.004**	**-0.002**
	(0.176)	**(0.067)**	**(0.172)**	**(0.068)**
Protestant	**0.505***	**0.193***	**0.235**	**0.092**
	(0.149)	**(0.055)**	**(0.149)**	**(0.057)**
2cd exp quartile	0.219*	0.086*	0.230*	0.090*
	(0.128)	(0.049)	(0.127)	(0.049)
3rd exp quartile	0.292	0.112	0.196	0.076
	(0.207)	(0.077)	(0.210)	(0.081)
4th exp quartile	0.926*	0.301***	0.803	0.273*
	(0.499)	(0.117)	(0.533)	(0.139)
Father prim education	0.212	0.083	0.100	0.040
	(0.133)	(0.052)	(0.113)	(0.045)
Father sec education	0.399*	0.152*	0.415*	0.159*
	(0.218)	(0.080)	(0.222)	(0.081)
Mother prim education	0.417***	0.163***	0.402***	0.157***
	(0.111)	(0.043)	(0.110)	(0.042)
Mother sec education	0.665***	0.240***	0.710***	0.254***
	(0.232)	(0.073)	(0.218)	(0.068)
Female	-0.017	-0.007	-0.008	-0.003
	(0.091)	(0.036)	(0.089)	(0.035)
N of children in schooling age	-0.080	-0.032	-0.081	-0.032
	(0.054)	(0.021)	(0.053)	(0.021)
Prop of Non-Christians			-0.470	-0.186
			(0.293)	(0.116)
Prop Catholics 1977			1.572*	0.621*
			(0.884)	(0.350)

	Coefficient	dp/dx	Coefficient	dp/dx
Stdnt. teacher ratio			0.004	0.001
			(0.002)	(0.001)
Schools per 1000 inhabitants			0.092	0.036
			(0.127)	(0.050)
Secondary school in municipality			0.161	0.064
			(0.163)	(0.064)
Travel time to nearest urban centre			-0.007	-0.003
			(0.005)	(0.002)
Constant	-0.143		-0.109	
	(0.261)		(0.391)	
Observations	918	918	918	918

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: chi2(6) = 13.75, prob > chi2 = 0.0326.

Turning to other controls in this model, both a school's distance and its fees now have a strongly significant effect on the probability of enrolment.[135] This suggests that parents in these (generally poorer) communities are much more sensitive to the accessibility and costs of schooling, including the possibility that larger families only invest selectively in the education of some of their children. Moreover, also in this sub-sample mother's education represents one of the strongest and most robust determinants of educational status at the household level.

The findings of this section confirm that, also in the current school age cohort, private providers – most of which are affiliated with the major churches- continue to contribute significantly to the observed interreligious inequalities in educational outcomes. Wherever private schools are available, children of Christian parents are much more likely to attend these alternative school types than their peers from non-Christian households. Once other common determinants of education

---

[135] Because of the large number of children who are out of school in this sub-sample, data on school distances and fees was missing for well over a quarter of observations. Since the omission of such a large section of the sample would have biased the estimation results, missing values were replace with the sample's average for school distance. It is realistic to assume that the sub-sample mean is lower than the true distances in the most remote communities. Therefore, the resulting estimate of the effect of distance on schooling choice should be a conservative approximation of the true effect.

demand have been controlled for (such as household income or parental educational background), these uneven rates in private school attendance account almost entirely for any remaining differences in primary enrolments between the major religious groups. However, this effect of private school provision relates directly to the previously discussed historical inequalities in educational outcomes, through the uneven placement of private facilities. Because private providers today predominantly establish their schools in areas that already benefited from historically higher levels of education provision, most enrolment effects associated with private schools are concentrated in areas that already had historically better educational outcomes. Therefore, while private providers play an important role in meeting unmet demand for quality primary education, they also contribute to the persistence of interreligious inequalities in schooling outcomes in Madagascar.

Exactly what explains these differences in private school enrolments in areas where these facilities are more easily accessible is, unfortunately, harder to determine with the data available here. For example, it is possible that in the sub-sample of communities with private schools, private and particularly religious providers prefer to place their schools in neighbourhoods with a larger Christian population. Where this is this case, the remaining effect of religion on private school enrolment could capture the resulting variations in the accessibility of private facilities, rather than differences in household preferences or informal discrimination based on religious beliefs. However, with the data available here it is not possible to fully discount the possibility that, even in the absence of formal discrimination against non-Christians, private providers may still find ways to discourage non-Christians from enrolling, or that religious providers create positive incentives for school enrolment that apply particularly to children from households of the same Christian confession.

2.9 Conclusion

This chapter provides—to my knowledge—the first systematic study of interreligious inequalities in educational outcomes in a sub-Saharan setting. The findings suggest that in the context of a low-income country like Madagascar, assumptions often made in the context of the debate on the effect of religion on socio-economic outcomes—namely that different religious groups have different fundamental preferences for education—may have to be reconsidered. In the case study presented here, inequalities in educational outcomes between 'traditional' believers and Christians appear to be largely determined by historical inequalities in the provision of formal schooling to the two groups. Direct links between religious affiliation and fundamental preferences for modern education are harder to establish.

Two principle mechanisms have been identified that may explain the persistence of these inequalities over time. First, there is a significant degree of spatial segregation between Christians and traditional believers, which coincides with lower levels of school availability for the latter group. Qualitative and quantitative evidence presented in this chapter suggests that this pattern of segregation originated in highly unequal outreach of missionary churches in the late 19th and the early 20th century. In addition to spreading the Christian faith, missionaries also laid the foundations of the modern education system through the creation of religious schools. Inequalities in education created at the time then persisted over generations due to insufficient investments in the public school network and higher rates of human capital accumulation in areas that benefited earlier from missionary schooling. Particularly in older age cohorts, these spatial inequalities have an effect on education outcomes independent of religious affiliation.

Another indirectly related reason for the observed inequalities between religious groups is contemporary imbalances in the provision of private education. In Madagascar, as in many other low-income countries, public primary schools are of extremely low quality. Private providers play an important role by compensating for shortcomings in public primary education. However, most private schools—many of which are operated by the major Christian churches—cater primarily to the Christian population, and many private facilities are located in predominantly Christian areas that already have comparatively high levels of public school supply. Private education thus reinforces historical inequalities in primary school coverage and it contributes directly to the interreligious inequalities observed here. In fact, in the case of Madagascar, differences in the accessibility of private schools appear to drive almost all of the observed interreligious differences in primary school enrolments in the current student population.

The policy implications of these findings are not trivial and put into question some of the more established views on education reform in Madagascar. The first implication is the need to reconsider the role private providers can and should play in the context of the government's aim of attaining universal primary education coverage in the island. While private schooling increases both the overall amount and quality of primary education, private providers are evidently not bound by the same equity considerations as their counterparts in the public sector. This exacerbates existing imbalances in primary education and may counteract objectives of achieving full primary school coverage in the near future. Targeting strategies for public education programming need to take account of these inequalities as a reallocation of public expenditures may be required to offset imbalances created by private school provision.

Other important conclusions arise from the strong geographic inequalities in educational outcomes that were uncovered in this chapter. Spatial variations in the

accessibility and quality of public primary schools discussed here create a strong deterrent to education demand, particularly in predominantly non-Christian areas that are historically disadvantaged in terms of formal school supply. This reinforces a case often made in Madagascar that considerable investments are still required to improve primary school infrastructures and staffing levels in rural areas (see for example Stifel et al. 2008: 14).[136]

However, the findings of this study also indicate that these educational investments may not always coincide with other poverty alleviation objectives in Madagascar. In particular the fact that contemporary trends in the spatial distribution of income poverty in the island do not always perfectly overlap with the historical inequalities in education documented here suggest that in the Malagasy context, an increase in rural education provision may not always be the most direct remedy to poverty. For example, predominantly Christian regions of the southern highlands, which have historically benefited from higher levels of education provision, have poverty levels well above the national average. In these areas alternative interventions, such as investments in agricultural productivity or the rural road network, are likely to have a larger impact on poverty than additional investments in the public school network. This suggests that it may, in cases, be necessary to consider more carefully the role primary education should play in poverty alleviation policies in the island. In some regions priorities identified for the education sector will not match those of more conventional, income-based targeting strategies, and a compromise between potentially competing educational policies and poverty alleviation objectives may have to be sought.

Finally, the strong geographic nature of the educational inequalities discussed here has promising implications for the design of policies that would offset the gap in

---

[136] Such investments may be complemented by a reduction in local school fees or targeted conditional cash transfers, in order to enhance incentives for primary school attendance.

schooling levels between religious groups. The fact that interreligious differences in education in Madagascar are associated with strong levels of spatial segregation of traditional believers means that it is possible to design policies in favour of the non-Christian population around geographically targeted interventions. This would be a welcome feature, as geographically-targeted programmes are generally less likely to upset intergroup relations than alternative interventions that would target traditional believers directly. For example, it is often noted that some affirmative action programmes or transfer mechanisms designed to improve the outcomes of particular groups stigmatize programme beneficiaries (see for example Stewart et al. 2007). In the context of Madagascar, this might reinforce religious identities and create political conflicts along religious lines not hitherto encountered in the island. Geographically-targeted programmes generally avoid these problems since they can be directed to the entire population of disadvantaged areas. As such, they would offer a culturally and politically more 'neutral' strategy to address interreligious inequalities in the island.

In short, the educational shortfall of non-Christians observed in this study appears to be amendable to well designed policy interventions. However, a reduction of these inequalities would require a substantive redistribution of educational expenditures towards traditional believers that would by far exceed any previous public resource allocations to this historically disadvantaged group.

2.10 Statistical Annex Chapter 2

ANNEX FOR SECTION 2.6: GEOGRAPHIC ANALYSIS

Table 2.16. Descriptive statistics, geographic analysis

Variable	Mean	Standard deviation
Enrolment rate	0.12	0.07
Primary graduation rate	49.06	25.25
Missionary staff per 1000 inhabitants in 1945	0.26	0.16
Proportion of Catholics in 1977	0.19	0.15
Dry season travel time (hrs)	17.04	21.55
No road access (dummy)	0.38	0.49
Infrastructure index	-0.07	2.06
Proportion of students in private	0.13	0.18
Student-teacher ratio	62.45	37.30
Number of schools per village	1.09	0.81
Number of schools per 1000 inhabitants	0.98	0.75
Population	13283.82	9420.21
Distance to capital (km)	697.04	729.75

Source: Author's estimate based on community census. Estimates exclude primary urban centres.

Table 2.17. Geographic determinants of primary school graduation rates – selection model

	(1)	(2)	(3)	(4)
Km to capital	-0.282***	-0.283***	-0.286***	-0.286***
	(0.045)	(0.050)	(0.049)	(0.049)
Fianarantsoa	1.057***	1.063***	0.999***	1.026***
	(0.168)	(0.153)	(0.154)	(0.147)
Toamasina	1.328***	1.316***	1.353***	1.339***
	(0.178)	(0.181)	(0.177)	(0.183)
Mahajanga	0.812***	0.797***	0.814***	0.805***
	(0.172)	(0.174)	(0.173)	(0.175)
Tulear	-0.299**	-0.301**	-0.313**	-0.309**
	(0.145)	(0.142)	(0.142)	(0.142)
Antsiranana	0.794***	0.785***	0.813***	0.804***
	(0.202)	(0.205)	(0.204)	(0.208)
Proportion of private schools	0.342	0.311	0.304	0.315
	(0.233)	(0.226)	(0.228)	(0.228)
Constant	-0.090	-0.083	-0.073	-0.079
	(0.129)	(0.125)	(0.126)	(0.126)
athrho	**-0.096**	**-0.143**	**0.084**	**-0.008**
	(0.209)	**(0.186)**	**(0.170)**	**(0.169)**
lnsigma	-0.062***	-0.070***	-0.063***	-0.072***
	(0.023)	(0.024)	(0.022)	(0.022)
Observations	1249	1249	1249	1249

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Estimates exclude primary urban centres. Source: Author's estimates based on community census. A non-significant test statistic for athrho indicates a lower likelihood of sample selection bias.

Table 2.18. Instrumental variable estimates, school enrolments (full model)

	(1)	(2)	(3)	(4)
First stage				
Dependent variable	Religious staff in 1945	Religious staff in 1945	Proportion of Catholics in 1977	Proportion of Catholics in 1977
Km to capital	-0.417***	-0.417***	-0.435***	-0.435***
	(0.022)	(0.022)	(0.021)	(0.021)
Constant	0.013	0.013	-0.001	-0.001
	(0.025)	(0.025)	(0.025)	(0.025)
Observations	1293	1293	1293	1293
R-squared	0.173	0.173	0.192	0.192
Second stage				
Dependent variable	Primary school enrolment rate		Primary school enrolment rate	
Religious staff in 1945 (instrumented)	0.133**	0.106**		
	(0.058)	(0.049)		
Proportion of Catholics in 1977 (instrumented)			0.127**	0.101**
			(0.055)	(0.046)
Dry season travel time	-0.132***	-0.042**	-0.132***	-0.041**
	(0.025)	(0.018)	(0.025)	(0.018)
No road access	-0.014	-0.044**	-0.014	-0.044**
	(0.029)	(0.019)	(0.029)	(0.019)
Infrastructure index	0.405***	0.323***	0.405***	0.323***
	(0.040)	(0.031)	(0.04)	(0.030)
Prop' of students in private		0.101***		0.101***
		(0.032)		(0.031)
Student-teacher ratio		0.278***		0.278***
		(0.049)		(0.048)
Schools per village		0.029		0.029
		(0.020)		(0.029)
Schools per 1000 inhabitants		0.828***		0.828***
		(0.039)		(0.039)
Population	-0.896***	-0.171**	-0.896***	-0.171**
	(0.097)	(0.070)	(0.096)	(0.070)
Constant	-0.036	0.025	-0.034	0.026
	(0.024)	(0.017)	(0.024)	(0.017)
chi^2 [a]	192.10***	26.75***	175.34***	59.89***
Observations	1244	1244	1244	1244
R-squared	0.168	0.616	0.168	0.616

Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. [a] chi test statistic of a Hausman test for differences in coefficients between the relevant base model and its equivalent IV. A significant test statistic indicates that the differences between coefficients are not random. Source: Author's estimates based on community census data.

Table 2.19. Instrumental variable estimates, school graduations (full model)

	(1)	(2)	(3)	(4)
First stage				
Dependent variable	**Religious staff in 1945**	**Religious staff in 1945**	**Proportion of Catholics in 1977**	**Proportion of Catholics in 1977**
Km to capital	-0.417***	-0.417***	-0.435***	-0.435***
	(0.022)	(0.022)	(0.021)	(0.02)
Constant	0.013	0.013	-0.001	-0.001
	(0.025)	(0.025)	(0.025)	(0.025)
Observations	1293	1293	1293	1293
R-squared	0.173	0.173	0.192	0.192
Second stage				
Dependent variable	**Primary graduation rate**		**Primary graduation rate**	
Religious staff in 1945 (instrumented)	**0.071**	**-0.002**		
	(0.107)	**(0.109)**		
Proportion of Catholics in 1977 (instrumented)			**0.068**	**-0.002**
			(0.102)	**(0.105)**
Dry season travel time	-0.122***	-0.092**	-0.122***	-0.092**
	(0.044)	(0.044)	(0.044)	(0.044)
No road access	-0.016	-0.012	-0.016	-0.012
	(0.039)	(0.039)	(0.039)	(0.039)
Infrastructure index	0.244***	0.174***	0.244***	0.174***
	(0.039)	(0.040)	(0.039)	(0.040)
Prop' of students in private		0.165***		0.165***
		(0.039)		(0.039)
Student-teacher ratio		-0.083**		-0.083**
		(0.042)		(0.042)
Schools per village		0.085***		0.085***
		(0.033)		(0.033)
Schools per 1000 inhabitants		-0.077		-0.077
		(0.049)		(0.049)
Population	0.083	0.002	0.083	0.002
	(0.114)	(0.122)	(0.114)	(0.122)
Constant	-0.026	-0.016	-0.025	-0.016
	(0.033)	(0.033)	(0.033)	(0.033)
chi^{2} [a]	36.51***	48.56***	106.83***	31.98***
Observations	860	860	860	860
R-squared	0.092	0.124	0.092	0.124

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Estimates do not control for possible sample selection bias. [a] chi test statistic of a Hausman test for differences in coefficients between the relevant base model and its equivalent IV. A significant test statistic indicates that the differences between coefficients are not random. Source: Author's estimates based on community census data.

Table 2.20 Descriptive statistics, national household survey, older age cohorts

	Age 16-25		Age 26-35		Age 36-45		Age 46 or older	
	mean	sd	Mean	sd	mean	sd	mean	sd
No schooling	0.26	0.44	0.23	0.42	0.27	0.44	0.40	0.49
Primary schooling	0.42	0.49	0.41	0.49	0.43	0.49	0.39	0.49
Secondary or higher	0.31	0.46	0.35	0.48	0.30	0.46	0.20	0.40
No degree	0.63	0.48	0.58	0.49	0.62	0.49	0.73	0.44
Primary degree	0.21	0.40	0.22	0.42	0.17	0.38	0.11	0.32
Secondary or higher degree	0.12	0.32	0.16	0.37	0.18	0.38	0.11	0.31
Proportion Catholics 1977	0.19	0.15	0.20	0.16	0.20	0.16	0.21	0.16
Missionary staff in 1945	0.27	0.16	0.28	0.17	0.27	0.17	0.27	0.16
Colonial infrastructure	0.45	0.23	0.48	0.25	0.47	0.24	0.44	0.23
Distance to capital	388.75	423.71	386.67	440.06	399.55	466.25	400.92	467.75
Female	0.52	0.50	0.54	0.50	0.51	0.50	0.50	0.50
Age	19.51	3.19	30.32	2.85	40.23	2.75	56.92	9.45
Catholic	0.38	0.49	0.36	0.48	0.39	0.49	0.39	0.49
Protestant	0.35	0.48	0.38	0.49	0.35	0.48	0.34	0.47
Father primary educ.	0.43	0.50	0.39	0.49	0.39	0.49	0.29	0.45
Father secondary educ. or higher	0.23	0.42	0.19	0.40	0.14	0.35	0.09	0.29

Source: Author's estimates, 2001 national household survey and community census.

163

Table 2.21 Marginal effects, schooling model cohort regressions (1945 data)

Age 16-25

	(1)	(2)	(3)
	No schooling	Primary	Secondary or higher
Missionary staff in 1945	**-0.265*****	**-0.002**	**0.267*****
	(0.053)	**(0.012)**	**(0.054)**
Colonial infrastructure	-0.052	-0.000	0.052
	(0.041)	(0.002)	(0.041)
Distance to capital	-0.000***	-0.000	0.000***
	(0.000)	(0.000)	(0.000)
Female	0.020	0.000	-0.020
	(0.015)	(0.001)	(0.015)
Age	0.001	0.000	-0.001
	(0.002)	(0.000)	(0.002)
Catholic	-0.218***	-0.046***	0.263***
	(0.018)	(0.012)	(0.024)
Protestant	-0.216***	-0.039***	0.255***
	(0.018)	(0.011)	(0.024)
Father primary educ.	-0.153***	-0.006	0.159***
	(0.017)	(0.007)	(0.018)
Father secondary educ. or higher	-0.279***	-0.253***	0.532***
	(0.012)	(0.027)	(0.031)
Observations	2865	2865	2865

Age 26-35

	(1)	(2)	(3)
	No schooling	Primary	Secondary or higher
Missionary staff in 1945	**-0.130****	**-0.038***	**0.167****
	(0.060)	**(0.020)**	**(0.078)**
Colonial infrastructure	0.014	0.004	-0.018
	(0.039)	(0.011)	(0.050)
Distance to capital	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	0.040**	0.012**	-0.052**
	(0.016)	(0.006)	(0.022)
Age	-0.006**	-0.002*	0.008**
	(0.003)	(0.001)	(0.004)
Catholic	-0.190***	-0.106***	0.297***
	(0.018)	(0.018)	(0.031)
Protestant	-0.218***	-0.097***	0.315***
	(0.020)	(0.017)	(0.030)
Father primary educ.	-0.174***	-0.069***	0.244***
	(0.018)	(0.013)	(0.024)
Father secondary educ. or higher	-0.230***	-0.359***	0.589***
	(0.014)	(0.031)	(0.034)
Observations	1754	1754	1754

Table 2.21 (continued)

Age 36-45

	(1)	(2)	(3)
	No schooling	Primary	Secondary or higher
Missionary staff in 1945	-0.007	0.000	0.007
	(0.080)	(0.005)	(0.075)
Colonial infrastructure	-0.149***	0.008	0.140***
	(0.057)	(0.010)	(0.054)
Distance to capital	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	0.121***	-0.006	-0.115***
	(0.023)	(0.007)	(0.021)
Age	0.013***	-0.001	-0.012***
	(0.004)	(0.001)	(0.004)
Catholic	-0.285***	-0.041**	0.327***
	(0.024)	(0.019)	(0.031)
Protestant	-0.290***	-0.052**	0.342***
	(0.025)	(0.020)	(0.034)
Father primary educ.	-0.235***	-0.016	0.250***
	(0.022)	(0.014)	(0.024)
Father secondary educ. or higher	-0.254***	-0.292***	0.547***
	(0.016)	(0.051)	(0.056)
Observations	1365	1365	1365

Age 46 or older

	(1)	(2)	(3)
	No schooling	Primary	Secondary or higher
Missionary staff in 1945	-0.333***	0.181***	0.152***
	(0.095)	(0.053)	(0.045)
Colonial infrastructure	0.042	-0.023	-0.019
	(0.074)	(0.041)	(0.034)
Distance to capital	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Female	0.186***	-0.101***	-0.085***
	(0.027)	(0.016)	(0.014)
Age	0.008***	-0.004***	-0.003***
	(0.002)	(0.001)	(0.001)
Catholic	-0.340***	0.145***	0.195***
	(0.031)	(0.017)	(0.024)
Protestant	-0.332***	0.135***	0.197***
	(0.031)	(0.017)	(0.025)
Father primary educ.	-0.265***	0.104***	0.160***
	(0.027)	(0.014)	(0.021)
Father secondary educ. or higher	-0.392***	-0.124**	0.517***
	(0.019)	(0.048)	(0.058)
Observations	1636	1636	1636

Marginal effects estimated at sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census.

Table 2.22. Marginal effects, degree model, cohort regressions (1945 data)

Age 16-25

	(1)	(2)	(3)
	No degree	Primary	Secondary or higher
Missionary staff in 1945	-0.414***	0.269***	0.145***
	(0.066)	(0.045)	(0.025)
Colonial infrastructure	-0.128**	0.083**	0.045**
	(0.053)	(0.035)	(0.019)
Distance to capital	-0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Female	0.008	-0.005	-0.003
	(0.020)	(0.013)	(0.007)
Age	-0.005	0.003	0.002
	(0.003)	(0.002)	(0.001)
Catholic	-0.255***	0.152***	0.103***
	(0.034)	(0.020)	(0.016)
Protestant	-0.217***	0.132***	0.085***
	(0.034)	(0.020)	(0.015)
Father primary educ.	-0.097***	0.063***	0.035***
	(0.026)	(0.016)	(0.010)
Father secondary educ. or higher	-0.510***	0.217***	0.293***
	(0.031)	(0.014)	(0.028)
Observations	2754	2754	2754

Age 26-35

	(1)	(2)	(3)
	No degree	Primary	Secondary or higher
Missionary staff in 1945	-0.297***	0.165***	0.132***
	(0.090)	(0.050)	(0.041)
Colonial infrastructure	-0.032	0.017	0.014
	(0.061)	(0.034)	(0.027)
Distance to capital	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	0.075***	-0.041***	-0.034***
	(0.027)	(0.015)	(0.013)
Age	-0.011**	0.006**	0.005**
	(0.005)	(0.003)	(0.002)
Catholic	-0.271***	0.133***	0.138***
	(0.042)	(0.020)	(0.025)
Protestant	-0.304***	0.152***	0.151***
	(0.040)	(0.020)	(0.023)
Father primary educ.	-0.223***	0.117***	0.106***
	(0.033)	(0.018)	(0.017)
Father secondary educ. or higher	-0.567***	0.134***	0.433***
	(0.032)	(0.016)	(0.038)
Observations	1709	1709	1709

Table 2.22 (continued)

Age 36-45

	(1)	(2)	(3)
	No degree	Primary	Secondary or higher
Missionary staff in 1945	-0.186*	0.092*	0.093*
	(0.095)	(0.048)	(0.048)
Colonial infrastructure	-0.211***	0.105***	0.106***
	(0.073)	(0.037)	(0.038)
Distance to capital	-0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Female	0.118***	-0.058***	-0.060***
	(0.030)	(0.015)	(0.016)
Age	0.018***	-0.009***	-0.009***
	(0.005)	(0.003)	(0.003)
Catholic	-0.395***	0.163***	0.233***
	(0.049)	(0.021)	(0.035)
Protestant	-0.410***	0.165***	0.245***
	(0.050)	(0.021)	(0.035)
Father primary educ.	-0.209***	0.098***	0.112***
	(0.034)	(0.016)	(0.020)
Father secondary educ. or higher	-0.557***	0.104***	0.453***
	(0.039)	(0.018)	(0.049)
Observations	1335	1335	1335

Age 46 or older

	(1)	(2)	(3)
	No degree	Primary	Secondary or higher
Missionary staff in 1945	-0.148**	0.092**	0.056**
	(0.073)	(0.045)	(0.028)
Colonial infrastructure	-0.097*	0.060*	0.037*
	(0.054)	(0.034)	(0.021)
Distance to capital	-0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Female	0.139***	-0.085***	-0.054***
	(0.022)	(0.013)	(0.010)
Age	0.004***	-0.002***	-0.001***
	(0.001)	(0.001)	(0.000)
Catholic	-0.212***	0.121***	0.091***
	(0.039)	(0.022)	(0.020)
Protestant	-0.221***	0.125***	0.096***
	(0.041)	(0.022)	(0.022)
Father primary educ.	-0.189***	0.106***	0.082***
	(0.030)	(0.018)	(0.016)
Father secondary educ. or higher	-0.559***	0.181***	0.378***
	(0.050)	(0.017)	(0.051)
Observations	1576	1576	1576

Marginal effects estimated at sample mean. Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's calculations, National Household Survey 2001 and community census.

Table 2.23. Marginal effects, schooling model cohort regressions (1977 data)

Age 16-25

	(1) No schooling	(2) Primary	(3) Secondary or higher
Proportion of	**-0.228***	**-0.002**	**0.230***
Catholics in 1977	**(0.052)**	**(0.010)**	**(0.053)**
Colonial	-0.072*	-0.000	0.072*
infrastructure	(0.039)	(0.003)	(0.040)
Distance to capital	-0.000**	-0.000	0.000**
	(0.000)	(0.000)	(0.000)
Female	0.021	0.000	-0.021
	(0.015)	(0.001)	(0.015)
Age	0.000	0.000	-0.000
	(0.002)	(0.000)	(0.002)
Catholic	-0.217***	-0.045***	0.262***
	(0.018)	(0.012)	(0.025)
Protestant	-0.222***	-0.040***	0.261***
	(0.018)	(0.012)	(0.024)
Father primary educ.	-0.153***	-0.005	0.159***
	(0.017)	(0.007)	(0.018)
Father secondary	-0.283***	-0.259***	0.541***
educ. or higher	(0.012)	(0.027)	(0.031)
Observations	2865	2865	2865

Age 26-35

	(1) No schooling	(2) Primary	(3) Secondary or higher
Proportion of	**-0.129**	**-0.037**	**0.167**
Catholics in 1977	**(0.059)**	**(0.019)**	**(0.077)**
Colonial	-0.001	-0.000	0.001
infrastructure	(0.038)	(0.011)	(0.049)
Distance to capital	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	0.040**	0.012**	-0.052**
	(0.016)	(0.006)	(0.022)
Age	-0.006**	-0.002*	0.007**
	(0.003)	(0.001)	(0.004)
Catholic	-0.189***	-0.105***	0.295***
	(0.019)	(0.019)	(0.032)
Protestant	-0.219***	-0.097***	0.317***
	(0.020)	(0.017)	(0.031)
Father primary educ.	-0.174***	-0.069***	0.244***
	(0.018)	(0.013)	(0.024)
Father secondary	-0.231***	-0.363***	0.594***
educ. or higher	(0.013)	(0.030)	(0.033)
Observations	1754	1754	1754

Table 2.23 (continued)

Age 36-45

	(1)	(2)	(3)
	No schooling	Primary	Secondary or higher
Proportion of	0.032	-0.002	-0.030
Catholics in 1977	(0.085)	(0.005)	(0.080)
Colonial	-0.151***	0.009	0.143***
infrastructure	(0.057)	(0.010)	(0.054)
Distance to capital	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	0.121***	-0.006	-0.115***
	(0.023)	(0.007)	(0.021)
Age	0.013***	-0.001	-0.012***
	(0.004)	(0.001)	(0.004)
Catholic	-0.288***	-0.042**	0.331***
	(0.024)	(0.019)	(0.031)
Protestant	-0.294***	-0.054***	0.348***
	(0.025)	(0.021)	(0.034)
Father primary educ.	-0.236***	-0.016	0.252***
	(0.022)	(0.014)	(0.025)
Father secondary	-0.255***	-0.294***	0.548***
educ. or higher	(0.016)	(0.051)	(0.056)
Observations	1365	1365	1365

Age 45 or older

	(1)	(2)	(3)
	No schooling	Primary	Secondary or higher
Proportion of	-0.266***	0.144***	0.122***
Catholics in 1977	(0.098)	(0.053)	(0.046)
Colonial	0.012	-0.006	-0.005
infrastructure	(0.076)	(0.041)	(0.035)
Distance to capital	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Female	0.183***	-0.099***	-0.084***
	(0.027)	(0.016)	(0.014)
Age	0.008***	-0.004***	-0.003***
	(0.002)	(0.001)	(0.001)
Catholic	-0.341***	0.145***	0.196***
	(0.032)	(0.017)	(0.025)
Protestant	-0.342***	0.137***	0.205***
	(0.031)	(0.017)	(0.026)
Father primary educ.	-0.269***	0.105***	0.165***
	(0.026)	(0.014)	(0.021)
Father secondary	-0.393***	-0.125***	0.518***
educ. or higher	(0.019)	(0.048)	(0.058)
Observations	1636	1636	1636

Marginal effects estimated at sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census.

Table 2.24. Marginal effects, degree model, cohort regressions (1977 data)

Age 16-25

	(1)	(2)	(3)
	No degree	Primary	Secondary or higher
Proportion of	-0.145**	0.092**	0.052**
Catholics in 1977	(0.065)	(0.042)	(0.024)
Colonial	-0.179***	0.114***	0.065***
infrastructure	(0.051)	(0.033)	(0.019)
Distance to capital	-0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Female	0.010	-0.007	-0.004
	(0.020)	(0.013)	(0.007)
Age	-0.006*	0.004*	0.002*
	(0.003)	(0.002)	(0.001)
Catholic	-0.279***	0.161***	0.118***
	(0.034)	(0.019)	(0.017)
Protestant	-0.258***	0.151***	0.106***
	(0.033)	(0.019)	(0.017)
Father primary educ.	-0.106***	0.067***	0.039***
	(0.026)	(0.016)	(0.010)
Father secondary	-0.523***	0.212***	0.311***
educ. or higher	(0.030)	(0.014)	(0.028)
Observations	2754	2754	2754

Age 26-35

	(1)	(2)	(3)
	No degree	Primary	Secondary or higher
Proportion of	-0.051	0.028	0.023
Catholics in 1977	(0.091)	(0.050)	(0.041)
Colonial	-0.077	0.042	0.034
infrastructure	(0.060)	(0.033)	(0.027)
Distance to capital	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	0.076***	-0.041***	-0.034***
	(0.027)	(0.015)	(0.013)
Age	-0.011**	0.006**	0.005**
	(0.005)	(0.003)	(0.002)
Catholic	-0.296***	0.142***	0.154***
	(0.042)	(0.019)	(0.026)
Protestant	-0.335***	0.164***	0.171***
	(0.039)	(0.020)	(0.024)
Father primary educ.	-0.236***	0.122***	0.114***
	(0.032)	(0.018)	(0.017)
Father secondary	-0.576***	0.130***	0.446***
educ. or higher	(0.031)	(0.016)	(0.038)
Observations	1709	1709	1709

170

Table 2.24 (continued)

Age 36-45

	(1) No degree	(2) Primary	(3) Secondary or higher
Proportion of	**-0.084**	**0.041**	**0.042**
Catholics in 1977	**(0.103)**	**(0.051)**	**(0.052)**
Colonial	-0.233***	0.116***	0.118***
infrastructure	(0.073)	(0.037)	(0.038)
Distance to capital	-0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Female	0.112***	-0.055***	-0.057***
	(0.030)	(0.015)	(0.016)
Age	0.018***	-0.009***	-0.009***
	(0.005)	(0.003)	(0.003)
Catholic	-0.405***	0.165***	0.241***
	(0.049)	(0.021)	(0.035)
Protestant	-0.423***	0.167***	0.256***
	(0.050)	(0.021)	(0.036)
Father primary educ.	-0.215***	0.099***	0.115***
	(0.034)	(0.016)	(0.021)
Father secondary	-0.559***	0.102***	0.457***
educ. or higher	(0.038)	(0.018)	(0.048)
Observations	1335	1335	1335

Age 46 or older

	(1) No degree	(2) Primary	(3) Secondary or higher
Proportion of	**-0.126***	**0.078***	**0.048***
Catholics in 1977	**(0.070)**	**(0.043)**	**(0.027)**
Colonial	-0.113**	0.070**	0.043**
infrastructure	(0.054)	(0.034)	(0.021)
Distance to capital	-0.000*	0.000*	0.000*
	(0.000)	(0.000)	(0.000)
Female	0.138***	-0.084***	-0.054***
	(0.022)	(0.013)	(0.010)
Age	0.004***	-0.002***	-0.001***
	(0.001)	(0.001)	(0.000)
Catholic	-0.213***	0.121***	0.092***
	(0.039)	(0.022)	(0.020)
Protestant	-0.227***	0.128***	0.100***
	(0.041)	(0.022)	(0.022)
Father primary educ.	-0.191***	0.107***	0.084***
	(0.030)	(0.017)	(0.016)
Father secondary	-0.559***	0.180***	0.379***
educ. or higher	(0.050)	(0.017)	(0.051)
Observations	1576	1576	1576

Marginal effects estimated at sample mean. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census.

Table 2.25. Descriptive statistics, household sample, current school age cohort

	Pooled sample		Sub-sample with private schools in community		Sub-sample with no private school in community	
	mean	sd	mean	sd	mean	sd
Enrolled in private	0.16	0.37	0.22	0.42	n.a.	n.a.
Enrolled in public	0.47	0.50	0.44	0.50	0.55	0.50
Distance to public school	577.02	606.98	617.42	584.47	497.43	642.01
Distance to private school	904.40	972.39	925.25	1006.69	n.a.	n.a.
Fees public school	6.89	9.38	7.12	8.70	6.44	10.57
Fees private school	58.18	82.69	63.84	86.60	n.a.	n.a.
Catholic	0.34	0.47	0.39	0.49	0.24	0.43
Protestant	0.36	0.48	0.40	0.49	0.29	0.45
2cd exp quartile	0.28	0.45	0.29	0.45	0.27	0.44
3rd exp quartile	0.16	0.36	0.18	0.39	0.11	0.32
4th exp quartile	0.05	0.21	0.07	0.25	0.01	0.10
Father prim education	0.43	0.49	0.41	0.49	0.46	0.50
Father sec education	0.30	0.46	0.37	0.48	0.19	0.39
Mother prim education	0.45	0.50	0.45	0.50	0.46	0.50
Mother sec education	0.22	0.41	0.28	0.45	0.09	0.29
Female	0.49	0.50	0.49	0.50	0.49	0.50
N of children in schooling age	2.19	1.01	2.18	0.99	2.22	1.05
Prop of private schools	0.23	0.23	0.35	0.20	0	0
Prop of Non-Christians	0.28	0.32	0.19	0.27	0.47	0.34
Prop Catholics 1977	0.18	0.15	0.22	0.17	0.12	0.08
Stdnt. teacher ratio	57.75	28.38	52.81	25.49	66.96	31.09
Schools per 1000 inhabitants	0.86	0.71	0.83	0.67	0.89	0.79
Secondary school in munic.	0.79	0.41	0.93	0.25	0.53	0.50
Travel time to urban centre	12.16	15.02	8.68	12.02	18.64	17.69

Source: Author's estimates, 2001 national household survey and community census.

Table 2.26. Determinants of school choice, pooled sample, coefficient estimates

	No community controls		With community controls	
	(1)	(2)	(3)	(4)
Alternative specific variables	Public school alternative	Private school alternative	Public school alternative	Private school alternative
Distance to school	-0.353	-0.353	-0.404	-0.404
	(0.224)	(0.224)	(0.272)	(0.272)
School fees	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Household and community variables				
Catholic	**0.405***	**1.067***	**0.172**	**1.158**
	(0.141)	**(0.602)**	**(0.144)**	**(0.886)**
Protestant	**0.695***	**1.103****	**0.470***	**1.166**
	(0.138)	**(0.518)**	**(0.134)**	**(0.780)**
2cd exp quartile	0.349***	0.618*	0.377***	0.742*
	(0.127)	(0.327)	(0.127)	(0.399)
3rd exp quartile	0.316*	1.014*	0.371**	1.228*
	(0.166)	(0.517)	(0.170)	(0.657)
4th exp quartile	-0.176	1.294	-0.030	1.660
	(0.268)	(0.925)	(0.275)	(1.143)
Father prim education	0.276**	0.200	0.211	0.252
	(0.131)	(0.287)	(0.132)	(0.336)
Father sec education	0.422**	0.877*	0.418**	1.090*
	(0.188)	(0.455)	(0.189)	(0.576)
Mother prim education	0.631***	0.275	0.587***	0.247
	(0.128)	(0.313)	(0.131)	(0.375)
Mother sec education	1.010***	0.768*	0.985***	0.786*
	(0.192)	(0.409)	(0.188)	(0.469)
Female	0.031	0.048	0.027	0.059
	(0.083)	(0.158)	(0.085)	(0.176)
N of children in schooling age	-0.074	0.027	-0.064	0.037
	(0.051)	(0.097)	(0.050)	(0.110)
Prop of private schools	-0.626**	-0.123	-0.708**	-0.344
	(0.308)	(0.497)	(0.302)	(0.632)
Prop of Non-Christians			-0.545*	0.040
			(0.281)	(1.068)
Prop Catholics 1977			0.176	0.838
			(0.562)	(1.017)
Stdnt. teacher ratio			0.000	-0.001
			(0.002)	(0.004)
Schools per 1000 inhabitants			0.116	0.012
			(0.128)	(0.164)
Secondary school in municipality			0.041	-0.206
			(0.173)	(0.401)
Travel time to nearest urban centre			-0.004	-0.009
			(0.004)	(0.010)
Constant	-0.541***	-2.101	-0.282	-2.238
	(0.194)	(1.318)	(0.341)	(1.802)

lnl2_2	0.521		0.635	
	(0.577)		(0.633)	
l2_1	0.732*		1.037**	
	(0.434)		(0.488)	
Observations	2441	2441	2441	2441

No enrolment is the reference category for each school alternative. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: (F[12, 173] =0.89, Prob > F = 0.5544.

Table 2.27. Determinants of school choice, sub-sample communities with private schools, coefficient estimates

	No community controls		With community controls	
	(1)	(2)	(3)	(4)
Alternative specific variables	Public school alternative	Private school alternative	Public school alternative	Private school alternative
Distance to school	-0.232	-0.232	-0.240	-0.240
	(0.145)	(0.145)	(0.173)	(0.173)
School fees	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Household and community variables				
Catholic	**0.475****	**1.778****	**0.232**	**1.717**
	(0.185)	**(0.787)**	**(0.204)**	**(1.100)**
Protestant	**0.841*****	**1.859****	**0.565*****	**1.793***
	(0.186)	**(0.712)**	**(0.183)**	**(0.982)**
2cd exp quartile	0.448***	0.632**	0.483***	0.752**
	(0.166)	(0.293)	(0.161)	(0.335)
3rd exp quartile	0.379*	1.024**	0.488**	1.167**
	(0.208)	(0.432)	(0.213)	(0.557)
4th exp quartile	-0.252	0.977	0.006	1.191
	(0.298)	(0.674)	(0.336)	(0.855)
Father prim education	0.310*	0.428	0.193	0.445
	(0.184)	(0.312)	(0.186)	(0.367)
Father sec education	0.496**	1.112**	0.473**	1.238*
	(0.233)	(0.523)	(0.229)	(0.660)
Mother prim education	0.792***	0.147	0.647***	0.159
	(0.186)	(0.366)	(0.202)	(0.448)
Mother sec education	1.130***	0.565	1.050***	0.664
	(0.243)	(0.414)	(0.243)	(0.471)
Female	0.047	0.074	0.043	0.086
	(0.107)	(0.165)	(0.108)	(0.170)
N of children in schooling age	-0.030	-0.026	-0.026	-0.017
	(0.065)	(0.090)	(0.062)	(0.086)

	Public school alternative	Private school alternative	Public school alternative	Private school alternative
Prop of private schools	-0.495	0.093	-0.201	0.048
	(0.376)	(0.593)	(0.371)	(0.604)
Prop of Non-Christians			-0.880**	1.024
			(0.344)	(1.636)
Prop Catholics 1977			-0.130	0.379
			(0.573)	(0.912)
Stdnt. teacher ratio			-0.000	-0.002
			(0.002)	(0.004)
Schools per 1000 inhabitants			0.179	0.126
			(0.129)	(0.144)
Secondary school in municip.			0.188	-0.087
			(0.247)	(0.356)
Travel time to urban centre			-0.010*	-0.027**
			(0.006)	(0.013)
Constant	-0.950***	-2.760*	-0.636	-2.593
	(0.212)	(1.403)	(0.458)	(1.864)
lnl2_2	0.389		0.260	
	(0.517)		(0.775)	
l2_1	0.879**		1.490***	
	(0.389)		(0.422)	
Observations	1634	1634	1634	1634

No enrolment is the reference category for each school alternative. Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's calculations, National Household Survey 2001 and community census. Wald test statistic for the joint significance of the community controls: $F(12,118) = 1.84$, Prob > F = 0.0489.

3 Who is poorest? A 'low tech' approach to multidimensional poverty comparisons[137]

3.1 Introduction

This chapter makes two contributions to the literature on the spatial analysis of wellbeing. The first idea proposed here is to base the geographic analysis of poverty and wellbeing on a more conceptually grounded notion of space. Whereas conventional approaches to poverty and inequality analysis often rely on rough a priori definitions of space, such as urban-rural strata or administrative regions, this chapter proposes to define geographic units used in poverty comparisons through differences in access to public services, including specific services such as water, sanitation or electricity. As will be demonstrated, this approach offers distinct advantages over the conventional literature, because the underlying spatial units of comparison are more meaningful in an analytical and a policy sense (Kanbur 2006, Shorrocks / Wan 2005) and because the breakdown captures more fine-grained variations in living standards than more common urban-rural or geographic decompositions. Moreover, when combined with alternative measures of wellbeing these area definitions may be used for simple two- or multidimensional comparisons of geographic development. For example, in the case study used here poverty comparisons will be made simultaneously over the dimensions of public service access and private wealth. The result is a more fine-grained and more intuitively accessible picture of possible policy priorities than the one emerging from existing one or multidimensional comparisons of poverty.

The second idea presented in this chapter relates more specifically to a fast growing body of literature on so-called asset or basic needs indices. Asset-based approaches, as I call them from now on, assess the level of wellbeing of a

---

[137] An earlier version of this chapter was presented at the annual conference of the Human Development and Capability Association, New Delhi, India. September, 2008.

household on the basis of observable household characteristics such as the number of consumer durables owned, the quality of the dwelling structure, or the household's access to public services. Information on all of these characteristics is then typically integrated into a single index with the help of simple counting procedures, or more complex data reduction techniques such as principle component or factor analysis (cf. among others Filmer/Pritchett 1998, Sahn/Stifel 2000, 2003, 2003a). Here the contribution is to show that, contrary to common perceptions, these indices can also be used for two-dimensional comparisons of wellbeing once the underlying index has been created. More concretely, I illustrate how the index can be decomposed into sub-components that relate to different dimensions of wellbeing, focussing specifically on the dimension of private wealth and public service access. These decompositions are then used for two-dimensional spatial comparisons of wellbeing along the lines discussed above.

3.1.1 Strengths and weaknesses of asset-based indices

Asset-based indices are increasingly used as a low-cost but reliable alternative to more conventional consumption-based measures of wellbeing. Recent applications of the asset index include cross-country poverty comparisons in sub-Saharan Africa (Booysen et al. 2008, Sahn / Stifel 2000, 2003a, see below), the targeting of microfinance interventions (Henry et al. 2003), demography and health research (Montgomery/Hewett 2005, Schellenberg et al. 2003, Durkin et al. 1994) and educational research (Filmer / Pritchett 1998).

The advantages of asset-based indices over consumption-based measures cited in the literature are both of an analytical and a practical nature. It is often observed that household asset wealth tends to be less affected by short-term or seasonal fluctuations in income than household expenditure. This makes asset-based indices a better indicator of a household's longer-run level of wellbeing—a feature that is reflected in a growing literature that use asset data to study longer-

term poverty dynamics and questions of vulnerability and chronic poverty (see for example Hulme/ McKay 2007, Barrett et al. 2006, Carter / Barrett 2006, Carter / May 1999).[138]

On the practical side, information on assets is less costly to collect and less prone to measurement error than household consumption because most durables or housing characteristics included in the indices are directly observable to survey enumerators.[139] For instance, an often-noted problem in the expenditure aggregates is the imputation of information on local prices required to make household consumption comparable across time or spatial contexts. Particularly in developing countries, where markets are poorly integrated and consumption patterns often differ substantively across groups or regions, this has led to strong doubts about the validity and reliability of interpersonal comparisons made under the consumption-based approach.[140] Asset indices do not require imputing price data, and thus avoid many of these problems (Sahn / Stifel 2000).

A related advantage is that asset indices will often provide a more consistent basis for the targeting and evaluation of poverty alleviation programmes. For example an often-noted problem in developing country contexts is that consumption aggregates used to track poverty trends and target expenditures at the national level are not easily observed at the local level. This is especially true for information on household consumption of self-produced food stocks, which usually has to be estimated and imputed though lengthy procedures that cannot be easily replicated at the local level. This problem of replicating consumption aggregates locally may introduce an element of inconsistency into the administration of pro-poor programmes, as it implies that national and local

---

[138] For example, it is reasonable to assume that wealthier households will sell assets during times of crisis in order to smooth expenditures. Since households with no assets are unable to do this, insufficient asset ownership may be regarded as a sign of chronic poverty and increased vulnerability to shocks.

[139] This is a particular advantage in rural areas with high rates of subsistence farming where even basic food expenditure cannot be directly observed (cf. Deaton 1997).

[140] These problems concern both the reliability of information on local market prices and differences in relative prices. See for example Deaton 1997, Ravallion / Bidani 1994).

administrators will usually not use the same information to select beneficiaries or to evaluate the poverty impact of an intervention. Asset-based approaches offer a more favourable alternative in this context as information on household asset ownership (and other relevant characteristics) collected in national survey and census data is easily observed and replicated at the local level.

In addition to these practical advantages, an asset-based index is used here because it allows the incorporation of information from a wider domain of a person's or household's wellbeing (the "welfare space") than is usually captured under the consumption-based approach. In most cases the variables used to construct asset indices tend to be of binary / discrete format (measuring for example whether a household owns a certain asset or not). This makes it straightforward to include information on qualitative aspects of a household's living standard. In this chapter I use this property to include variables in the index that identify whether a household has access to a certain public service or not, thus establishing a link to the service-related definition of space used in the geographical poverty comparisons presented in this chapter.[141]

Under the consumption-based approach information on service access is much more difficult to incorporate and comparisons in this domain may be inconsistent. Since most services are provided free of charge or with public subsidies (such as water or transport), it is usually impossible to infer the exact costs of these goods from reported household expenditures. This implies that welfare comparisons under the consumption-based approach usually do not take into account differences in public service access. Even worse, welfare comparisons may actually be distorted if households in areas with no public supply have to purchase basic services and utilities from private providers (such as water). Because these privately sold services are often more costly than comparative services in the public sector, households in areas with insufficient

---

[141] In principle any other qualitative aspects of a households level of wellbeing can be included in the index, making this method compatible with other schools of thought in poverty analysis such as Nussbaum's (2000) basic needs approach. I will not explore this link here.

public goods provision may register higher monthly expenditures (and thus higher levels of "welfare") than comparable households in better connected areas—clearly an undesirable starting point for poverty comparisons.[142]

However, before asset-based indices can be applied to the type of multidimensional analysis proposed here, it is necessary to deal with a frequently-mentioned limitation of the asset-based approach. So far, studies that have used asset indices have tended to compare levels of wellbeing by simply looking at individual or household scores on the joint index. However, they typically have not accounted for the specific contribution that variables relating to different dimensions of wellbeing covered in the index make to the overall ranking of an individual on the asset metric. This implies that most applications of the asset-based approach tended to be multidimensional only at the "input end"—where variables are entered into the index—but not at the output end—where the welfare ranking of households is compared on the asset metric. The evident disadvantage of this approach is that it becomes impossible to identify and compare how individuals fare on the different dimensions of wellbeing included in the index.

This chapter argues that this self-limitation to one-dimensional comparisons of wellbeing in the literature on asset indices is both unnecessary and undesirable. Taking the example of an asset index which incorporates dimensions of private wealth (ownership of household durables and housing quality) and public service access, the chapter shows that, under certain aggregation procedures, asset indices can be easily decomposed into their separate sub-components, thus regaining some of the initial multidimensionality

---

[142] Some authors have suggested imputing prices for public utilities such as water or electricity using extrapolations from households who purchase these utilities from private provider (Hentschel / Lanjouw 1998). Yet, as noted by the authors, even under this procedure it is neither possible to account for possible variations in service quality, nor for differences in the elasticity of demand for services provided by private and public providers. More importantly, imputing user fees to rural households who have no access to such goods or who only access natural sources of inferior quality would again distort welfare comparisons, since it would shift the expenditures of these households upwards.

in the selection of "input" variables that is usually lost once variables have been aggregated into the asset index. While the resulting comparisons do not allow taking into account possible complementarities or correlations between the different dimensions of wellbeing considered (see for example Atkinson 2003, Bourguignon/ Chakravarty 2003, Duclos et al. 2006, 2006a), they do provide an easily interpretable framework to simultaneously assess individual and spatial differences in private wealth and public goods provision that is not available in the same way under the conventional income-based approach.[143]

Another limitation is that asset-based approaches cannot easily be linked to an intuitively meaningful definition of the poverty line. For instance, household durables or electrical appliances often included in asset indices to capture differences in private wealth do not reflect essential requirements. Similarly, even when information on various public goods is incorporated in an index, as is the case in this chapter, it is not always possible to determine a critical level of service supply below which a household should be considered as critically deprived.[144] Here, I will address this problem with the help of so-called stochastic dominance tests. These tests, which are frequently used for poverty comparisons under the consumption-based framework, permit a comparison of the welfare ranking of different groups in the population by a variety of conventional poverty measures (such as the poverty headcount or poverty gap) *without* requiring arbitrary definitions of poverty lines. As such they offer a convenient basis for poverty comparisons under the asset-based approach.

---

[143] Another problem is that the approach discussed here cannot take into account variations in the levels of deprivation within the regions over which comparisons are carried out (or correlations between different instances of poverty). In fact, the spatial comparisons of wellbeing presented depend crucially on the assumption that populations in areas that have insufficient or no access to public services are *collectively* worse off than areas with access to such services. However, while this is arguably a greatly simplifying assumption, I will present several conceptual arguments that would justify it in the context of low-income countries.

[144] This problem does not apply in the same way to the consumption-based approach where poverty lines are often tied to a conception of basic needs (for example a common approach is to set at the poverty line at the level of expenditure where households are able to afford a basket of basic food and non-food items). Unfortunately no similarly intuitive definition for poverty lines exists under the asset-based approach.

The next sub-section presents the data used in this study and discusses existing evidence on the distribution of poverty outcomes in Madagascar, the case study that illustrates the approach. This is followed by an outline of the construction of the index and the results of a number of robustness and validity tests. Section 3.4. introduces the conceptual framework to interpret the index, focusing specifically on geographic comparisons of wellbeing. Section 3.5. presents the results of stochastic dominance tests and more fine-grained regional comparisons. Section 3.6. concludes and discusses the scope for possible replications of this approach.

3.2   The case study: data and country context

The following sections will illustrate the proposed approach drawing on information on housing characteristics and asset ownership from the 2001 National Household Survey for Madagascar as well as on information on local levels of service supply from the Madagascar 2001 community census. Both data sets are described in the previous chapter (Chapter 2).

Madagascar offers a good example to illustrate the ideas of this chapter, as there are considerable wellbeing inequalities both at the aggregate geographic level and within regions. Recent poverty estimates, using expenditure aggregates from the same household survey that provides the principle source of data for this analysis (2001), put the total share of the population below the poverty line at just over 70% (Romani 2003). As is often the case, this already high figure masks significant variation between urban and rural areas as well as between better off and poorer regions of the island. For instance, in rural areas, where most Malagasy live, poverty rates average 78%, compared to 'only' 26.4% in primary urban centres and 58.8% in rural towns and district capitals (Romani 2003). Likewise, differences in poverty outcomes tend to be particularly marked geographically between the northern and central highland regions of the island

and the southern and eastern provinces. For instance, poverty rates tend to be much lower in the central highland province Antananarivo and Antsiranana in the north, than in the southern and east-coast provinces Fianarantsoa, Tulear and Toamasina (see Table 3.2 below).

However, also within rural areas and geographic regions there exists considerable heterogeneity in living standards. Mistiaen et al. (2001), who use consumption estimates constructed for the national poverty map, find high levels of inequality within administrative provinces and even within districts. Previous research suggests that these variations are often closely associated with differences in the local level of public goods provision. Razafindravonona et al. (2001) disaggregate poverty headcounts by a municipality's level of remoteness, using a weighted index of indicators that capture local access to roads, health and education facilities, agricultural extensions services and modern fertilizer. Their findings suggest that between 1997 and 1999 poverty incidences in the most isolated areas deteriorated, while poverty rates improved in better-connected rural communities. In 1999 the resulting poverty rate in the most remote regions was 84%, compared to 72% in less isolated regions. More recent analysis that uses a similar measure of remoteness indicates that this distribution of poverty largely remained stable between 1999 and 2001 (Stifel et al. 2003, see Table 3.1).

Two additional tendencies that emerge from these studies deserve to be mentioned as they are corroborated by the findings of the case study below. The first is that the relationship between geographic isolation and poverty is not linear, with a relatively clear cut-off level between easily accessible and mildly remote rural communities, but less heterogeneity within more remote areas. Data from the aforementioned study by Stifel et al. (2003) shows that poverty rates jump quickly from 54% to over 75% between non-remote rural communes (travel times below one hour) and mildly remote areas (travel times just below 3.5 hours). Poverty rates then increase to around 85% in communities with travel times over 8 hours with only little variation between these and the most remote communities (travel times over 30 hours, see Table 3.1). As shown below, similar

183

patterns in the distribution of household also emerge under the alternative wellbeing index and the new definition of remoteness used in this chapter.

Table 3.1. Rural poverty incidence by level of remoteness

Isolation quintile	Average travel time to nearest urban centre (dry season)	Poverty incidence (in % of population)	Per capita consumption in Ariary
Most accessible	55 mins	53.6%	201 943
2	3 hrs 30 mins	76.9%	121 079
3	8 hrs 45 mins	85.3%	99 116
4	16 hrs 10 mins	85.3%	104 696
Least accessible	32hrs	85.5%	96 713

Source: Stifel et al. 2003: 68. Communities are classified into quintiles, based on their respective dry season travel time.

The second finding is that the aforementioned differences between the northern and southern regions of the island are often less clear when the analysis moves away from consumption as the sole indicator of household welfare. For example Duclos et al. (2006) who implement two-dimensional stochastic dominance tests on household per capita expenditures and children's height-for-age z score (HAZ) find that, while rural regions generally dominate urban areas in both dimensions, rankings are sometimes reversed in finer sub-regional breakdowns. This is especially the case for comparisons between urban and rural areas in the poorer south of the country (Tulear) and the wealthier northern provinces (Antsiranana / Mahajunga), where reversal occur in some cases for the two uni-variate distributions of consumption and children's HAZ scores.[145]

Similar reversals in the ranking of regions arise when one considers local levels of public goods provision (see Table 3.2). For instance, even though Antsiranana in the north has among the lowest urban and rural poverty headcounts in Madagascar, its supply of key public services such as electricity, post offices, health posts or education is much less developed than in other 'poorer' parts of the country. Both of these results suggest that one-dimensional comparisons of poverty that only focus on income or private wealth may

[145] Inconsistent rankings between the two dimensions also exist between some urban areas and rural regions within Tulear (see Duclos et al. 2006: 105f).

overlook these additional variations in local wellbeing and thus paint a misleading picture of actual living standards across regions of the island. This kind of heterogeneity between public and private goods-related dimensions of wellbeing is also documented by the methodology presented below.

Table 3.2. Poverty incidence and service access by province

	Antana-narivo	Antsira-nana	Maha-junga	Toama-sina	Fiana-rantsoa	Tulear
Rural poverty headcount	57.5%	79.3%	78.5%	89.1%	87.8%	83.4%
Urban poverty headcount	29.2%	27.9%	50.2%	61.1%	59.4%	52.2%
Average travel time to nearest town (in hrs)	2.25	4.15	7.45	6.20	5.40	7.05
% of communes with no motorized access	21.2%	23.0%	38.0%	51.7%	49.3%	32.5%
% of communes with bus stop	62.7%	16.0%	20.3%	34.2%	38.8%	43.8%
% of communes with post office	41.2%	20.0%	25.5%	26.8%	25.5%	24.6%
% of communes with market	37.7%	27.2%	31.8%	33.2%	38.8%	44.6%
% of communes with public electricity supply	35.0%	7.9%	10.9%	14.6%	8.9%	8.3%
% of communes with public water supply	66.9%	33.6%	34.9%	36.6%	32.1%	25.8%
Average student class room ratio	49.3	75.8	51.4	62.9	52.0	53.9
Number of health posts per village	0.2	0.1	0.2	0.2	0.1	0.1

Source: Cornell Community Census except rural and urban poverty headcounts (Romani 2003).

3.3 The approach

Asset-based approaches have already been applied to Madagascar in a series of studies. Barrett et al. (2006) find that differences in asset wealth in Madagascar explain much of persistent deprivation, while short term fluctuations in and out of poverty are largely random and transitory. Sahn and Stifel (2000) construct an asset index from Demographic and Health surveys (DHS) for Madagascar and 10 other sub-Saharan countries, to compare changes in poverty over time. In the specific case of Madagascar the authors report a reduction in the poverty headcount by over 3% between 1992 and 1997, an effect that they attribute primarily to improvements in rural areas (the effects are robust to shifts in the poverty line from 25 to 40% of the index). A subsequent paper shows that the asset index used in this initial study is robust to a number of validity tests. For example, the authors find that the asset index predicts children's HAZ scores at least as well as reported or predicted expenditure (in Madagascar the asset-based index actually outperformed expenditure-related measures in rural areas), and that it provides generally better predictions of the spread of HAZ scores and stunting rates across income quartiles in all the countries analyzed (Sahn/ Stifel 2003). A final study by the authors, which focuses specifically on rural–urban differences in living standards, finds that the asset index predicts comparable outcomes in relative rural deprivation as a range of other wellbeing indicators such as school enrolment rates, infant mortality, nutrition, family planning and accessibility of neonatal care health care, even though the urban-rural divide appears to be more marked in the case of the asset index (Sahn / Stifel 2003a).

A practical challenge in transferring the Sahn and Stifel index from cross-country comparisons to the type of within-country analysis undertaken here is the need to strike an appropriate balance between the competing aims of comparability and specificity. Because of data constraints (the DHS surveys used in the first study only recorded few asset-related variables) and the need to construct an index that is comparable across countries, the authors base their analysis on a restricted set of only 12 variables, including electric appliances such

as refrigerators and TV sets, bikes and motorized transport, access to public utilities such as piped water and sanitation (flush toilets). As the authors acknowledge, in the case of Madagascar, at least four of these variables— motorized transport, refrigerators, TVs and flush toilets—show hardly any positive observations in rural areas, while access to bicycles and piped water is rarely observed in the more remote rural regions of the country. This lack of variation in rural areas makes it difficult to use the Sahn and Stifel measure to assess inequalities in living standards for a large part of the population in Madagascar.[146]

On the other hand, a more detailed asset index also has to be carefully designed, since the relevance of many of the household characteristics it refers to may vary between regions of the country. A particular pertinent example is housing quality. In Madagascar, households in the sub-tropical coastal regions predominantly rely on natural materials (raffia or bamboo) for construction and dwelling structures rarely have more than one or two rooms for the whole family. In contrast, most households in the more temperate highland regions often inhabit quite elaborate brick houses that expand over up to three floors. Economic wealth only partially explains these differences, so that housing-related variables have to be treated with care in the analysis proposed here. For instance, the highland regions of the province of Fianarantsoa, where the described brick houses are most common, ranks among the poorer regions in the official poverty profiles for Madagascar, while some of the simplest housing structures can be found in the relatively wealthy vanilla-producing north-eastern regions.

The final list of variables adopted in this study aims to strike a compromise between the aims of comparability and specificity (see Table 3.3, below). Intuitively, the variables are meant to capture two distinct dimensions of wellbeing: access to public services—here represented by public utilities such as

---

[146]Sahn and Stifel drop Madagascar from their cross-country comparisons for this reason. Another consequence is that rural-urban differences in wealth are possibly overestimated. See also Filmer and Pritchett (1998), who observe similar problems with urban-rural differences in a comparable wealth ranking exercise for India.

potable water, electricity,[147] water, and sanitation[148]—and wealth in terms of private goods, measured by a set of variables on ownership of basic durables such as furniture, bicycles, radios, motorized transport and electric appliances that would be considered luxury items in Madagascar. In addition, the private wealth component of the index contains a set of variables describing the size and construction materials of the buildings occupied by the households (to avoid problems with regional-specific housing styles, only variables were selected that had stable correlation coefficients with other wealth-related variables in all parts of the country). All of the variables considered are recorded in binary format, taking the value 1 if the household owns one or more of the assets in question or if it satisfies the characteristics specified by the housing and public utilities related variables.

When these variables are combined into one single index, the question of the choice of aggregation procedure arises (see Chapter 1). For instance, should each variable be weighted on the basis of normative or theoretical arguments about its importance for household welfare? Or should each asset variable just enter the index with the same weight?[149] In the literature on asset indices the aggregation problem is usually addressed with the help of statistical methods that generate weights from the data. These typically include factor analysis—a technique used by Sahn and Stifel in the studies cited above—, principal component analysis (cf. Filmer / Pritchett 1998, see below), or more recently Multiple Correspondence analysis (Booysen et al. 2008).[150] In all of these cases, the weights assigned to each asset variable are inferred from statistical

---

[147] Approximated by the household's main source of light. Combustibles for cooking were added as an additional proxy.

[148] No toilets as opposed to flush toilet or latrines.

[149] This is the approach chosen by Dissatisfaction of Basic Needs Indices which are closely related to the index presented here. See for example Desai 1995, chapter 14.

[150] Factor analysis is a model-based technique that explains shared variance between input variables in terms of a small number of latent variables or factors. Principal component analysis is a much simpler data reduction technique that breaks down the correlation matrix of the input variables into a set of new orthogonal relationships, called components. The main practical difference between factor and principal component analysis is that the former does not require explaining the full correlation matrix of the input variables (see Sahn / Stifel 2000 for a good exposition of the technique).

associations between all of the asset variables included in the index. These weights are then used, based on the assumption that latent differences in household wealth explain most of the correlation in the underlying variable matrix.[151]

With large samples, different data reduction techniques will typically yield almost identical ranking of individuals, so it usually makes little difference which method is actually chosen.[152] This study uses principal component analysis because it has the added advantage that the scoring index on the first principal component is simply the linear combination of the weighted input variables. As will become clear in the following discussion, this feature greatly facilitates the interpretation of the resulting index. More importantly, it enables me to decompose the index into its various subcomponents, a characteristic that will be useful to distinguish how variables that relate to the dimensions of public services and variables that relate to private wealth influence the overall ranking of households (see below).

Principal component analysis transforms the set of asset variables into an equal number of mutually orthogonal linear combinations of the variables. Intuitively, the first principal component is the linear index of the full set of variables that captures the largest amount of information common to all of the

---

[151] While data generated weights can also be criticized as arbitrary, the use of these methods may be defended on two grounds. First, the primary purpose of the aggregation procedure here is to summarize information on asset variables *within* the same dimension of wellbeing. Concerns about the normative weight of each variable are evidently less relevant in this context. For example, asset variables such as ownership of a refrigerator or a radio are primarily indicators of wealth, but they are, in most cases not intrinsically important for a household's wellbeing. In this context data summary techniques may offer an appropriate (and widely used) tool to summarize the complex information on these multiple indicators within the same dimension (Decancq / Lugo 2009: 17). The second, albeit more hypothetical reason is that data generated weights may, indirectly, capture information on the social relevance of different asset variables. For example, it should be expected that most data driven techniques would assign large weights to refrigerators or television sets, as these appliances are primarily owned by households with a relative large stock of other assets. This implies that ownership of a television set or refrigerator would be a good indicator for the relative wealth of a household under the approach proposed here. The asset index may thus capture relevant differences in the social ranking of households in their community.
[152] For instance, in my data, the spearman correlation between indices generated by factor and principle component analysis was 0.995.

asset indicators (Filmer / Pritchett 1998:6). Adopting notation used by Filmer and Pritchett (1998), the asset index score for each household (A_j) estimated by a principal component analysis on a set of asset variables 1 to n may be expressed by the following equation:[153]

$$A_j = f_1 (a_{j1} - a_1) / (s_1) + f_2 (a_{j2} - a_2) / (s_2) + \ldots\ldots + f_n (a_{jn} - a_n) / (s_n) \qquad (1),$$

where f_1 is the component score coefficient of the first principle component in the first asset variable as estimated by the principal component analysis, a_{j1} is the value of the j th household on the first asset variable and a_1 and s_1 are the sample mean and standard deviation for the first asset variable (in other words the term behind the f_i represents each variable normalized by its mean and standard deviation). Because all asset variables only take the value of zero or one, the weights are easy to interpret. A shift from 0 to 1 in asset variable a_{ji} changes the index by f_i / s_i (Filmer/ Pritchett 1998:6).

Table 3.3 reports the component score coefficients, sample means and standard deviations and the resulting weights for each asset variable. Owning a radio increases a household's score on the asset index by 0.079 units, possession of a refrigerator raises it by 0.256, and access to piped water contributes 0.159 units. In contrast, having access to surface water and living in a dwelling structure with dirt floor reduces the score by 0.155 and 0.116 units respectively. Note, however, that the absolute scores on the wealth index have no direct interpretation. The only aim of the index is to create an ordinal ranking of households.

---

[153]This transformation is particularly useful for variables in binary format. Note that the resulting index is scaled differently than scoring indices calculated by most statistical packages. However, indices are identical when standardized.

Table 3.3. Variables included in the asset index

	Component score coeff. $(f_i)^*$	Mean	Standard deviation	Score coeff/sd (f_i / s_i)
Basic durables				
Radio	0.035	0.269	0.443	**0.079**
Radio-cassette	0.069	0.409	0.492	**0.140**
Chair	0.082	0.671	0.470	**0.173**
Bed	0.062	0.828	0.377	**0.163**
Table	0.077	0.720	0.449	**0.172**
Bike	0.043	0.141	0.348	**0.124**
Luxury items				
Motorized transport	0.043	0.031	0.173	**0.249**
Refrigerator	0.052	0.043	0.202	**0.256**
Stereo set	0.046	0.049	0.216	**0.211**
TV	0.095	0.242	0.428	**0.223**
Sewing machine	0.062	0.224	0.417	**0.148**
Electric or gas stove	0.048	0.044	0.204	**0.236**
Utilities				
Collect wood for cooking	-0.100	0.487	0.500	**-0.201**
Cook with charcoal	0.093	0.367	0.482	**0.192**
Surface water	-0.074	0.350	0.477	**-0.155**
Piped water	0.079	0.423	0.494	**0.159**
Latrine	0.031	0.570	0.495	**0.062**
Flush toilet	0.030	0.057	0.232	**0.131**
No toilet	-0.025	0.245	0.430	**-0.057**
Light: petroleum	-0.095	0.565	0.496	**-0.193**
Light: candle	0.040	0.084	0.278	**0.143**
Light: electric	0.094	0.289	0.453	**0.208**
Housing characteristics				
Wall: concrete	0.042	0.042	0.201	**0.209**
Wall: bricks	0.078	0.294	0.456	**0.172**
Walls: raffia or clay	-0.093	0.511	0.500	**-0.187**
1 room occupied	-0.047	0.406	0.491	**-0.096**
2-3 rooms occupied	0.025	0.457	0.498	**0.050**
More than 4 rooms occupied	0.035	0.131	0.338	**0.104**
Ceiling: wood	0.076	0.230	0.421	**0.181**
Floor: concrete	0.076	0.279	0.449	**0.170**
Floor: earth/clay	-0.053	0.301	0.459	**-0.116**

Source: Author's calculations based on the 2001 Madagascar National Household Survey.
*Weights assigned to each variable on the first component, normalized by its mean and standard deviation. These coefficients were calculated with SPSS version 14, which allowed correcting for the over-sampling of urban areas in the survey's sampling design. All remaining calculations presented in this chapter were estimated using Stata version 9. N=5065.

3.3.1 Validity and robustness of the index

Before proceeding, it is important to recognize that the index presented here is based on a very simple data-driven weighting technique. This means that outcomes could be affected by case-specific particularities in the distribution of variables that went into the index (although the large number of variables and observations considered here increases the possibility that outliers will cancel out). Therefore, before applying the wealth index to the analysis of actual income distribution it is worthwhile subjecting the index to a few robustness and validity tests.

The Kaiser-Meyer-Olkin measure of sampling adequacy is .781, acceptable for a sample of this size and a correlation matrix composed of over 30 variables.[154] Note however, that the first principal component used to construct the measure only explains approximately 25% of the joint variance of the input variables.[155] This means that other factors were driving differences in asset ownership that are not captured by the wealth index presented here.

Independent of this concern, the signs and magnitudes of the weight assigned to variables under the index do have strong intuitive appeal. As would be expected, variables identifying households with no toilet facility, low quality walls and floors, and whose sole source of water and cooking fuel are natural sources count towards a net reduction in the index score. The proportional size of the weights also seems plausible. For example the weight of a flush toilet is more than twice as large as that of a latrine and the weight of a simple radio is about half that of a radio cassette player and only one-third that of a stereo system. The only exception is the weight on motorized transport, which is surprisingly low (for example lower than the weight assigned to ownership of a refrigerator).

---

[154] This measure assesses whether the variables in the underlying correlation matrix are sufficiently correlated to merit a principal component or factor analysis. Values approaching .8 are generally considered acceptable. See for example http://www.stata.com/help.cgi?factor_postestimation, last accessed June 21st, 2010.

[155] The second and the third components explain 7.2% and 6.1% of the total variance, respectively.

However, this irregularity should only affect stratification at the highest end of the income scale, which will be of less interest in the subsequent analysis.

More formal robustness tests on the index were carried out by running separate principle component analysis on alternative sub-sets of variables, including sets with (i) no variables on public utilities, (ii) no variables on housing, (iii) only variables on household durables, (iv) only variables on utilities and housing, and (v) the full index with adjustments for household size.[156] With the exception of the third specification, which suppressed two-thirds of the variables included in the initial index, all of these alternative indices had a rank order correlation index of around 0.95 or higher (Table 3.4). Moreover, there were no very significant changes groupings in the population, particularly at the lower ("poorer") end of the distribution. It is worth noting, however, that specification (i) excluding variables on public utilities has among the lowest levels of correlation with the alternative specifications. This finding suggests that the inclusion of service-related variables into the index does indeed make a difference for the rank order of households, a result which is encouraging for the multidimensional approach adopted here.

Moving to tests of the validity of the index, Table 3.4 also shows that the scoring variable is quite strongly correlated with recorded household expenditures. This increases the probability that the index will pick up trends in the distribution of welfare that are similar to the official, consumption-based poverty statistics for Madagascar (see column 2, Table 3.4). It is important to keep in mind, however, that a full overlap between the two indicators is neither intended nor expected, given that the index chosen here is meant to pick up differences in service access and longer-term outcomes in private wealth that are not captured by conventional household consumption aggregates (see above).

---

[156] More specifically, adjustments for household size involved all variables on durables and the number of rooms occupied. Following Sahn and Stifel (2000) these variables were divided by the square root of household size, in order to account for possible economies of scale.

Table 3.4. Validity and robustness tests

	Per capita household expenditure	Robustness tests				
		No variables on utilities (i)	No variables on housing (ii)	No vars on utilities& housing (iii)	No variables on durables (iv)	With household size adjustment (v)
Population in bottom 40% of asset index	73.3%	88.5%	92.8%	86.5%	92.9%	94.3%
Population in middle 40% of asset index	56.8%	78.7%	86.4%	60%	83.9%	88.7%
Population in top 20% of asset index	60.1%	85%	86.3%	74.4%	82.2%	88.8%
Rank order correlation with asset index	0.72	0.95	0.98	0.88	0.95	0.98

Source: Author's calculations using the 2001 Madagascar National Household Survey.

A final concern is that the index created here could overstate the private wealth of the household over public goods access, as the index contains roughly twice as many variables on ownership of private goods (durables and housing) than variables that relate to the consumption of public goods. In other words the private goods dimension has twice the weight of the public goods dimension in the index and its contribution to the overall variation in the index is twice as high than that of public goods related variables. In the dominance tests discussed below I control for this by comparing the ranking of sub-populations between the full index and the private and public goods dimensions in isolation, with no significant differences in the resulting rankings of the sub-populations. In addition, I corrected for the larger weight of the private goods dimension by scaling each sub-section of the index by the number of variables that went into it. In other words, the section of the index on private goods was divided by 21 and the section of the index on public goods by 10. Again, there was no change in the outcomes of the dominance tests.

3.4 Geographic comparisons of wellbeing

As noted above, the statistical procedure used to generate the proposed index has the useful property that the overall score on the welfare index for household i is simply the linear combination of the weighted input variables for that household. This makes it simple to decompose the index into its separate sub-components. For instance, household i's score in the dimension of private wealth is simply the sum of the weights the household obtained on each of the variables corresponding to private wealth (i.e. all durables and luxury items), its score on the dimensions of public services is the sum of the weights obtained on all variables pertaining to that dimension, and so forth. Once this property is recognized the welfare index proposed here can be used for simple wellbeing comparisons that either take into account the combined effect of the different dimensions on local living standards, or it can be used to analyze differences in wellbeing separately in the dimensions of private wealth or public goods provision.

In the context of low-income countries, this property of the asset index can be easily extended to one- or two-dimensional comparisons at a spatial level, simply by comparing areas with respect to their level of private wealth and public goods provision. However, the conceptual foundation underlying these geographic comparisons departs somewhat from the usual literature on spatial inequality and poverty analysis, so it is useful to clearly spell out its underlying assumptions.

In the literature on spatial inequality, comparisons are typically made between sub-national jurisdictions (such as states or districts) or urban-rural strata. Yet there is now increasing recognition that these comparisons are not very meaningful unless additional information is provided on how geographic location is expected to affect local levels of wellbeing. In a recent review of research on geographic dimensions of inequality, Shorrocks and Wan (2005) note that most

of the existing evidence on spatial inequality is hard to interpret because it is not always clear how underlying spatial units relate to geographic or local institutional determinants of inequality. The authors conclude that estimated between-group components cannot and should not be taken as a measure of the geographic effect on overall inequality, unless the definition of space is clarified (Shorrocks and Wan 2005:68). The practical implications of this shortcoming are not trivial. For instance, Kanbur (2006) has argued that spatial decompositions that do not clarify why space matters as a determinant of local wellbeing will usually provide little indication as to whether existing welfare differences are best addressed by policies that target inequalities at the individual level (such as cash transfers) or at the geographic level (such as public investment programmes).[157]

I propose that a useful starting point to arrive at more meaningful definitions of space is to focus directly on differences in the levels of local public goods provision. There is now increasing evidence from the literature on economic geography that variations in local public infrastructures often outstrip natural geography as a determinant of variations in local livings standards and income levels (see Kanbur / Venables 2005 for an overview over this literature). As the review of the literature for Madagascar above has shown, similar evidence exists for Madagascar, where remoteness and local infrastructure endowments often emerge as strong correlates of local levels of household consumption (Stifel et al. 2003, Christiaensen et al. 2005).

The analysis of spatial inequalities according to local variations in service supply should also be of direct relevance for the recent literature on human

---

[157] Inappropriately defined spatial units should also affect the accuracy of geographic inequality and poverty estimates. If welfare-relevant differences in living conditions run across the boundaries of the geographic areas chosen, resulting wellbeing comparisons will be less meaningful because they are likely to mask considerable heterogeneity of outcomes within the underlying units of comparison. Recent research in developing countries, as well as the evidence presented here, suggests that this problem applies in particular to established urban-rural stratifications, which are routinely used in poverty profiles around the world (see Christiansen et al. 2005, Montgomery /Hewett 2005, McDade / Adair 2001 for evidence from other countries). It should be expected that similar problems also apply to inequality and poverty decompositions at more aggregate levels of spatial organization (such as states or provinces), especially in countries with high levels of geographic and social diversity.

wellbeing. Intuitively, individual levels of wellbeing should depend directly on the provision of public services such as sanitation or clean water supply. Any reasonable geographic comparison of wellbeing should thus rank communities with no service access below communities with service access, irrespective of whether any two households in the two sub-samples enjoy exactly the same level of private wealth (as measured by asset ownership and housing quality).

One way to think about this link between service provision and wellbeing is in terms of opportunity or choice. Even households that would normally be willing to use a public service, and that could afford possible user fees charged by the provider, cannot do so in a community with low levels of public goods provision, for the simple reason that national or local authorities fail to supply the service in question. As a result, these households face an effective limitation in the range of public services they can possibly consume. In other words, the non-provision of public services creates a cap on the maximum level of wellbeing they can attain.

In the case of poorer households, that may not be able or willing to pay for user fees, the non-provision of public goods may still lead to differences in wellbeing because of community-wide externalities of many local services. For example, key public infrastructure such as roads, public water fountains, or services such as waste management and public sanitation are either accessible to all individuals in a community, or their consumption by some households will generate positive effects for neighbouring households (Dasgupta/Kanbur 2005). In particular a recent literature on neighbourhood effects and public goods provision has shown that the utilization of clean water supply and closed sanitation systems by some households in a community creates benefits for households not connected to these services by reducing the overall incidence of water or airborne diseases. Thus even though not all households may directly use a local service, non-provision of the good would result in a net reduction in wellbeing for the entire local population (cf. Alderman et al. 2003, Sastry 1996). For instance, in the case of Madagascar a recent evaluation of a programme

designed to improve child health and nutrition found that children in communities with public water supply were more likely to show improved nutritional outcomes than children in communities with functioning water provision, controlling for other household and community characteristics and ensuring that mothers received the same amount of information on how to nurture their infants (Galasso / Umapathi, *forthcoming*).

To illustrate the proposed classification by service supply I look at the two public utilities included in the proposed asset index: electricity and water.[158] Adding urban municipalities, this information leads to a classification with four categories, namely primary urban centres (all urban areas have access to both types of services), rural communities that have both water and electricity, rural communities that have either water or electricity, and rural municipalities with no access to either of these services.

To further test for the local relevance of this classification I run a number of regressions between a set of dummy variables referring to each of the four categories (treating urban areas as the reference group) and three indicators of welfare, namely household per capita expenditure, household food share in consumption and the private wealth component of the asset index.[159] The estimation also controls for a number of other community-level characteristics including dry season travel time, the infrastructure index used in the previous chapter (without variables relating to utilities), as well as covariates commonly associated with variations in consumption and wealth at the household level. These covariates include the religion and years of schooling of the household

---

[158] In principle the list of services can be extended, provided the corresponding household variables have an acceptable level of correlation with other assets included in the index. Here I only use the variables with the highest correlation.

[159] More specifically, the estimation consists of three separate linear regression of each of the dependent variables on a set of dummies describing the level of service access in a community and the described control variables. The estimation uses the Stata's regression command for survey data. Urban areas are the reference category. Unfortunately the survey used for this analysis does not include other relevant outcomes such as nutrition levels or children's health status.

head, the educational attainment and average age of household members, as well as proportion of economically inactive members in the family.

Table 3.5. Location-specific and household-specific determinants of household welfare and wealth

	Log per capita expenditure	Log food share	Asset index score private wealth component
	(1)	(2)	(3)
Community with	**-0.352***	**0.093***	**-0.208***
water and electricity	**(0.078)**	**(0.024)**	**(0.052)**
Community with	**-0.739***	**0.204***	**-0.488***
water or electricity	**(0.129)**	**(0.039)**	**(0.091)**
Community with no	**-0.816***	**0.225***	**-0.513***
water or electricity	**(0.140)**	**(0.042)**	**(0.094)**
Dry season travel time	-0.001	-0.001	-0.002
	(0.002)	(0.001)	(0.001)
Infrastructure index	0.004	-0.006	-0.000
(no utilities)	(0.016)	(0.005)	(0.010)
Years education hh	0.009**	-0.003***	0.012***
head	(0.004)	(0.001)	(0.002)
Share hh members	-0.044***	0.004	0.015**
primary education	(0.009)	(0.005)	(0.007)
Share household	0.120***	-0.060***	0.140***
members secondary	(0.023)	(0.008)	(0.015)
education			
Share household	0.158***	-0.059***	0.117***
members higher	(0.023)	(0.015)	(0.019)
education			
Hh head traditional	-0.100*	0.041***	-0.169***
believer	(0.054)	(0.013)	(0.033)
Average age of	0.008***	-0.001	0.007***
household members	(0.002)	(0.001)	(0.002)
Proportion of infants	-0.955***	0.067*	-0.011
in hh	(0.104)	(0.037)	(0.075)
Proportion of children	-0.975***	0.022	-0.023
in household	(0.077)	(0.027)	(0.052)
Proportion of elderly	-0.329***	0.003	-0.263***
in household	(0.107)	(0.048)	(0.069)
Constant	14.24***	-0.495***	0.469***
	(0.147)	(0.045)	(0.101)
Observations	4,853	4,853	4,844
R-squared	0.398	0.279	0.440

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, urban areas are the omitted category. Source: Author's estimates, based on the 2001 Madagascar National Household Survey and the 2001 community census.

Without any claim for causality, the estimation suggests a strong and statistically significant association between household wellbeing and the proposed classification of communities. Treating urban areas as the reference category, there are statistically significant differences in household welfare and wealth in each of three categories of communities considered (Table 3.5). The size of these differences increases in magnitude along with the reduction in the level of public good provision in a community. Moreover, as is documented in the existing literature on spatial inequality in Madagascar, a clear cut-off point emerges between urban and better connected rural communities on the one hand and communities with no or only incomplete levels of service provision on the other. For instance, while differences between urban communities and rural communities with both utilities are relatively small in all three regressions, the size of the coefficient increases more than two-fold as one moves from rural communities with both utilities to areas with only water or sanitation. The change in the size of the coefficient is then relatively small as the analysis shifts to communities with no water or electricity. It is also worth noting that the overall fit of the model is best for the estimation of the private wealth component of the asset index. This may suggest that the proposed community classification is more appropriate to model differences in wellbeing under the proposed asset framework than under the more conventional consumption-based approach.

Returning to the asset index itself, the analysis of community-wide differences in service standards under the proposed framework can be carried out in a number of simple steps. Simply divide observations in the sample into households that live in areas with higher levels of public service supply and households with lower levels of service supply. Then compare rankings on the asset index for these different groups.

Table 3.6 presents summary statistics for the full asset index as well as its relevant sub-components (private wealth and housing and public utility access), distinguishing between urban areas and the three remaining categories of rural communes. The table also provides estimates of the population proportion in four

welfare quartiles, as defined by the national distribution on the full asset index. In the absence of a clear asset 'poverty line', this information can be used for simple distributional analysis of wellbeing under the proposed index.

A good entry point for the discussion is the maximum score attained by households in each category of municipalities. Even the wealthiest households in areas with no access to water and electricity face a ceiling in the maximum level of welfare they can attain on the asset index relative to wealthy households in areas which do have access to services, simply because there are no public utilities on offer. This is the deprivation effect in terms of opportunities that was described above.[160]

The effect of the non-provision of public services on poorer households is slightly more difficult to identify because the community-wide welfare effects discussed above are only indirectly measured by the index. Nonetheless, some evidence on resulting differences in wellbeing can be gained by looking at average population scores in the public goods dimension in isolation (line 3). For instance, the strong negative average score on the component of the index that relates to public services in rural communes with no or partial access to utilities indicates that large shares of the population in these areas have to rely on secondary sources for water, lighting and fuel woods—all variables that tend to have negative weights in the index (such as water from natural sources, collected wood for cooking and petroleum for light, see Table 3.3 above). This reflects actual differences in wellbeing, both with respect to the quality of the goods consumed, as well as with respect to the labour and opportunity costs involved in the collection of surface water and firewood.

---

[160] Note that the difference in the maximum values and means between municipalities with service access and municipalities without does not equal the combined weights of corresponding variables at the household level. This is due to high levels of correlation between some of the public good and private asset variables included in the index. For example, only very few households in areas with no access to electricity own refrigerators, stoves or TV and stereo sets. However, this does not affect the ordinal rankings of households on the index.

Table 3.6. Summary statistics by level of service access

	Primary urban centre	Rural municip., water and electricity	Rural municip., water or electricity	Rural municip., no water or electricity
Population mean full index*	1.41	0.67	-0.15	-0.28
Population Mean, private goods and housing only*	1.03	0.68	0.22	0.16
Population mean, public goods related variables only	0.39	-0.01	-0.37	-0.44
Sample Mean, full index	1.40	0.58	-0.13	-0.28
Standard deviation	0.77	0.93	0.70	0.51
Maximum score	3.53	3.22	2.45	2.13
Proportion of population in 1st quartile of the national distribution*	0.02	0.17	0.50	0.55
Proportion of population in 2cd quartile of the national distribution*	0.10	0.28	0.34	0.35
Proportion of population in 3rd quartile of the national distribution*	0.36	0.30	0.11	0.09
Proportion of population in 4th quartile of the national distribution*	0.52	0.25	0.04	0.01

Source: Author's calculations using the 2001 Madagascar National Household Survey. * Population estimates correcting for sampling design using Stata's svy mean command. Standard errors available on request from the author.

The index also produces a clear ordering in the distribution of wellbeing that complies well with the intuitive ideas outlined above. Average scores on all dimensions of the index are considerably lower for the less well-connected communes, suggesting that populations in this group are indeed worse off than in areas with higher levels of service supply. In addition, there is a clear divide between communities with no or only partial access to public utilities on the one hand and rural centres and urban areas on the other (with again strong differences between urban communes and rural centres). For example, in communities with no or partial access to public utilities, well over 80% of the population fall into the lowest two quartiles of the asset index, compared to only 12% in urban areas

202

and 45% in rural centres and better-connected rural areas. This corroborates previously discussed evidence that differences in wellbeing in Madagascar not only run along the traditional rural-urban divide but also between better-connected rural centres remote to medium-remote communes.

The average scores presented here may of course still mask considerable heterogeneity in outcomes, which would only emerge from more fine-grained analysis. For example, re-rankings between the four categories may occur at higher or lower values of the index, or outcomes on the index may vary across geographic areas of Madagascar. Both possibilities are explored in the next section.

3.5   Two-dimensional comparisons of wellbeing—dominance tests

Multidimensional indices of wellbeing of the type presented here raise potentially difficult ethical questions if the ordering of households or regions differs between dimensions. Take two regions, region A with no access to key public services such as water and sanitation but where households are on average so wealthy that their overall score on the asset index is well above the national average, and region B with access to services but where households are so poor in terms of private wealth that the average score of the region falls below the national mean on the full index. What would be the right policy response to address inequality in living standards in such a case? Should priority be given to improving levels of service supply in region A, given that such investments impact directly on the overall wellbeing of the local population? Or should priority be given to increasing the private wealth of households in region B (for example through a cash transfer program), assuming that such an intervention would lift some households out of poverty and/or make them considerably less vulnerable to shocks?

A useful starting point to identify such ambiguous cases under the present framework are so-called stochastic dominance tests, which are widely used in the literature on poverty comparisons (cf. Atkinson 1987, Foster/ Shorrocks 1988, Deaton 1997).[161] Stochastic dominance tests allow comparing the distribution of the welfare level of different populations, according to a wide range of possible poverty lines and widely used poverty measures such as the poverty headcount or the poverty gap. As such they offer an appealing instrument for poverty comparisons because they do not require the researcher to make ethically arbitrary choices of poverty lines or poverty measure. As I argued in the introduction, this property is particularly useful in the case of asset indices, which are harder to link to an intuitively convincing definition of the poverty lines. The intuition behind the tests is best explained graphically (Figure 1).[162]

Figure 3.1 shows the cumulative density function for household scores on the asset index with separate curves for each of the levels of service access. If the values on the horizontal axis are thought of as potential poverty lines—the score in the asset index below which households would be considered as poor—and the curves as the distribution of the sub-population for each of the four categories of communities, then the corresponding value on the vertical axis would be the fraction of each sub-population that falls below the poverty line at each corresponding level of service access. A curve that lies systematically above another curve at any point on the asset index indicates that a higher fraction of the population in question lives in poverty at any conceivable poverty line. A different way to put this is that the poverty incidence of the population represented by the higher curve statistically dominates that of the population traced by the lower curve, hence the name dominance test. Ambiguities only arise
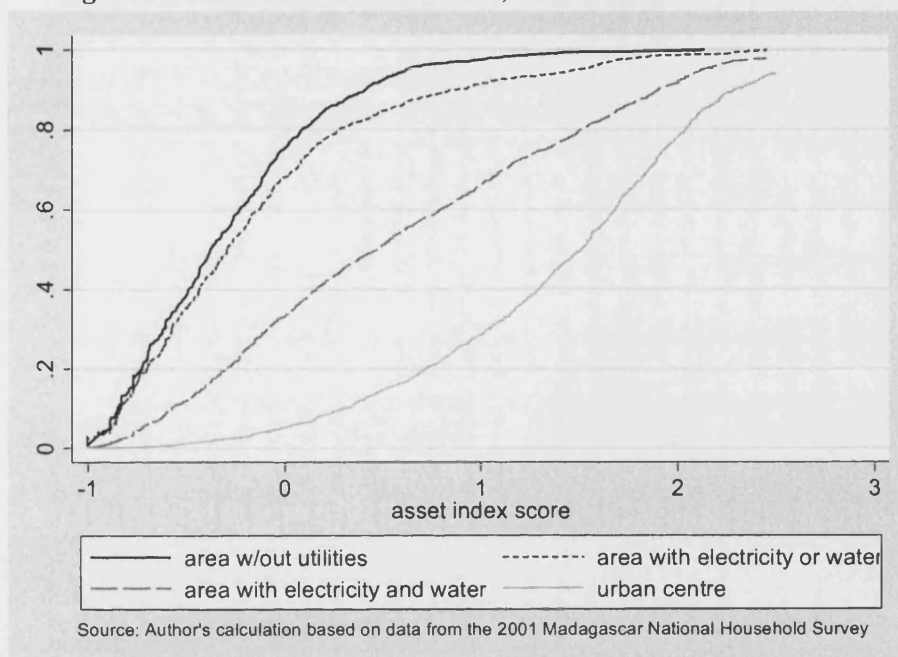
---

[161]Note that these tests do not provide any direct answer to the policy questions raised. These trade-offs usually involve such complex ethical and practical considerations that they are best considered on a case-by-case basis. However the methods do help at least to identify ambiguous orderings in the distribution of welfare where these questions have to be addressed.

[162] The following closely follows Duclos et al. (2006), who provide an exceptionally accessible exposition of the approach. Most of the tests considered here are for first-order dominance and identify differences in the poverty headcount. However it can be shown that first-order dominance implies dominance over other commonly used poverty measures such as poverty gap (cf. Deaton 1997: 163ff)

when the two curves cross. In such a case the welfare ranking of the sub-populations in question becomes dependent on the definition of the poverty line. Rank order reversals occur at the level where the two curves intersect.

Figure 3.1. First-order dominance, full index

asset index score

——— area w/out utilities   - - - - - - - area with electricity or water
– – – area with electricity and water   ——— urban centre

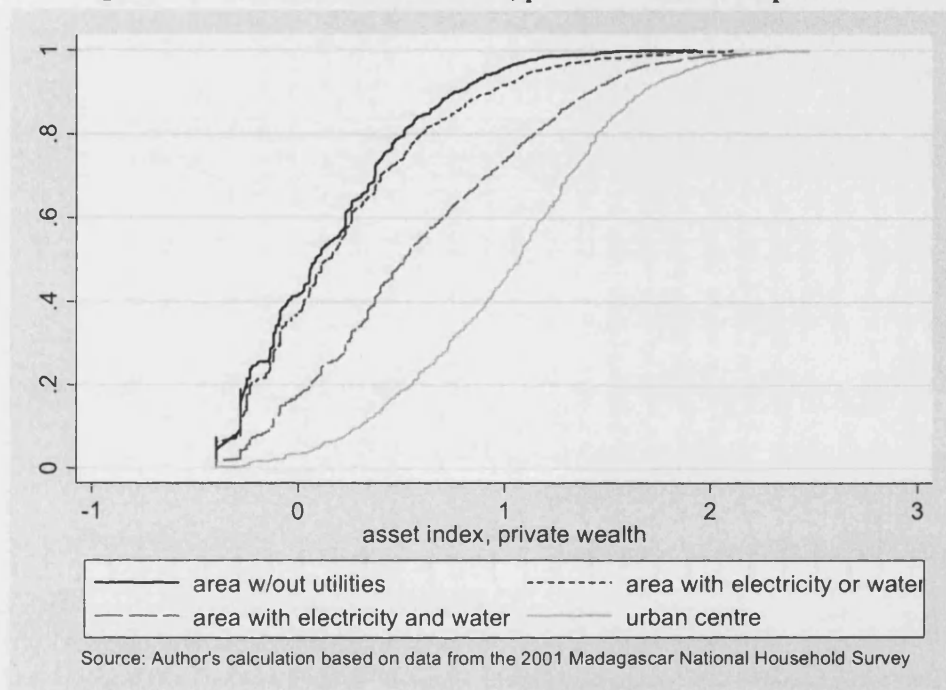Source: Author's calculation based on data from the 2001 Madagascar National Household Survey

Given the descriptive data presented in the previous section, it comes as no surprise that the ordering of sub-populations in the Malagasy case is unambiguous, no matter whether one looks simultaneously at the dimensions of public service access and private wealth (the full index, see Figure 3.1) or at the dimensions of private wealth in isolation (Figure 3.2).[163] In communities that lack access to either water or electricity, a substantially higher share of the population lives in poverty under any conceivable poverty line than in rural or urban regions where both services are provided. Excluding service-related variables and focusing exclusively on the private wealth dimension of the index (Figure 2) narrows the gaps between the curves considerably but does not lead to

---

[163] Similar tests were carried out for the part of the asset index that relates to public goods and for the part of index that relates to asset ownership excluding housing-related variables. None of these resulted in any reorderings.

changes in the overall ordering (note that the graphs in this figure are not as smooth because of the smaller number of input variables in the index).

Figure 3.2. **First-order dominance, private wealth component**

Source: Author's calculation based on data from the 2001 Madagascar National Household Survey

Another finding of interest is the proximity of the curves for populations in communities that have no access to either water or electricity and communities that benefit from at least one of the two services, as well as the distinct gap between urban and rural communes that both benefit from the two utilities considered here. Again this supports existing evidence, suggesting that in Madagascar marked differences in living standards not only exist between urban and rural areas but also between better-connected and less well-connected rural communities. High incidences of rural poverty are in other words not primarily a problem of the most isolated regions. Rather, poverty appears to be widespread, with a particularly strong cut-off line between well-connected rural centres and communities with relatively mild levels of remoteness.

3.5.1 Comparisons across regions

Even though the results presented so far point to a fairly unambiguous picture of the distribution of poverty in Madagascar, it is important to keep in mind that the underlying decomposition of poverty only involves four categories of communities. Is it possible that these averages mask more generic differences in living standards, including in particular between different geographic regions of the country?

In the case of Madagascar it is, in particular the economic inequality between the northern and central highland regions and the remaining coastal areas of the island that should be of concern here. This may lead to reversals in the established rank order of communities (see above). Rank reversals would occur if communities with lower levels of public service supply in the economically better-off regions achieve higher average scores on the private wealth component of the asset index than communities with higher levels of service supply in the poorer regions.

Table 3.7 explores this possibility through pair-wise comparisons of scores on the private wealth component of the index at the level of the 22 newly created administrative regions of the country. To simplify the exposition, the comparison will only involve better-connected rural centres that have access to both electricity and water and communities with no access to either of the two utilities. Each cell in the table reports the differences in the mean index score for the two types of areas.[164]

---

[164] Means and accompanying t-statistics were calculated at the level of 22 administrative regions of the country. Due to insufficient sample sizes three pairs of regions had to be combined and two regions dropped.

Table 3.7. Pair-wise comparisons of average scores: rural communities with service access vs. rural communities with no service access (by region)

	NORTH				Rural communities with no service access										SOUTH	
	1	2	3	5	7	8	9	12	13	14	16	17	19	20	21	22
1		0.43***	0.31***	0.41***	0.86***	0.74***	0.29***	0.63***	0.60***	0.78***	0.88***	0.89***	0.83***	0.82***	0.71***	0.54***
2	0.35***		0.21**	0.32***	0.76***	0.64***	0.19*	0.54***	0.50***	0.68***	0.78***	0.79***	0.73***	0.73***	0.61***	0.45***
3	0.48***	0.47***		0.45***	0.89***	0.77***	0.32***	0.67***	0.63***	0.81***	0.91***	0.93***	0.86***	0.86***	0.75***	0.58***
5	0.09	0.07	-0.05		0.50***	0.38***	-0.07	0.27***	0.24***	0.42***	0.51***	0.53***	0.46***	0.46***	0.35***	0.18***
7	0.31***	0.29***	0.17**	0.27***		0.60***	0.15	0.49***	0.46***	0.64***	0.73***	0.75***	0.69***	0.68***	0.57***	0.40***
8	-0.02	-0.04	-0.17**	-0.06	0.39***		-0.19**	0.16***	0.13*	0.31***	0.40***	0.42***	0.35***	0.35***	0.24***	0.07
9	0.24***	0.22***	0.09	0.20*	0.65***	0.53***		0.42***	0.39***	0.57***	0.66***	0.68***	0.61***	0.61***	0.50***	0.33***
12	-0.08	-0.09	-0.22**	-0.11	0.34***	0.22***	-0.24**		0.08	0.26***	0.35***	0.37***	0.30***	0.30***	0.19*	0.02
13	-0.03	-0.05	-0.17***	-0.06	0.38***	0.26***	-0.19**	0.16***		0.30***	0.40***	0.41***	0.35***	0.35***	0.23***	0.07
14	0.61***	0.60***	0.47***	0.58***	1.02***	0.91***	0.45***	0.80***	0.77***		1.04***	1.06***	0.99***	0.99***	0.88***	0.71***
16	-0.12*	-0.14***	-0.26***	-0.16	0.29***	0.17***	-0.28***	0.07	0.03	0.21***		0.32***	0.26***	0.26***	0.14	-0.02
17	0.17**	0.15**	0.03***	0.13	0.58***	0.46***	0.01	0.35***	0.32***	0.50***	0.60***		0.55***	0.54***	0.43***	0.26***
18	0.12	0.10	-0.02*	0.08	0.53***	0.41***	-0.04	0.31***	0.27***	0.45***	0.55***	0.56***	0.50***	0.50***	0.38***	0.22**
19	0.31***	0.30***	0.17	0.28**	0.72***	0.61***	0.15	0.50***	0.47***	0.65***	0.74***	0.76***		0.69***	0.58***	0.41***
20	0.21***	0.19***	0.07	0.17	0.62***	0.50***	0.05	0.40***	0.36***	0.54***	0.64***	0.65***	0.59***		0.47***	0.31***
21	-0.15***	-0.17***	-0.29***	-0.19*	0.26***	0.14***	-0.31***	0.04	0.00	0.18***	0.28***	0.29***	0.23**	0.22***		-0.05
22	0.14	0.12	-0.01	0.10	0.55***	0.43***	-0.03	0.32***	0.29**	0.47***	0.56***	0.58***	0.51***	0.51***	0.40***	

(Row groups: rows 1–3 = NORTH; "Communities with service access" spans the middle; rows 17–22 = SOUTH.)

The reported figures are differences in region specific sample means (on the asset index) between rural communities with no access to utilities and rural communities where utilities are provided. Positive numbers indicate that communities with service access are better off, as measured by the index (wealth component only).

Cases where communities with service access are significantly worse off than communities with no services are marked in grey.

Asterixes refer to significance levels of two sample t-tests (*= 10 %, **= 5%, ***= 1 %).

Regions 3 and 4, 9 and 11 and 14 and 15 had to be combined due to insufficient observations for the two levels of service access. Regions 6 and 10 had to be dropped since there were no observations at either level of service access. Region 18 only has information for communities with both utilities.
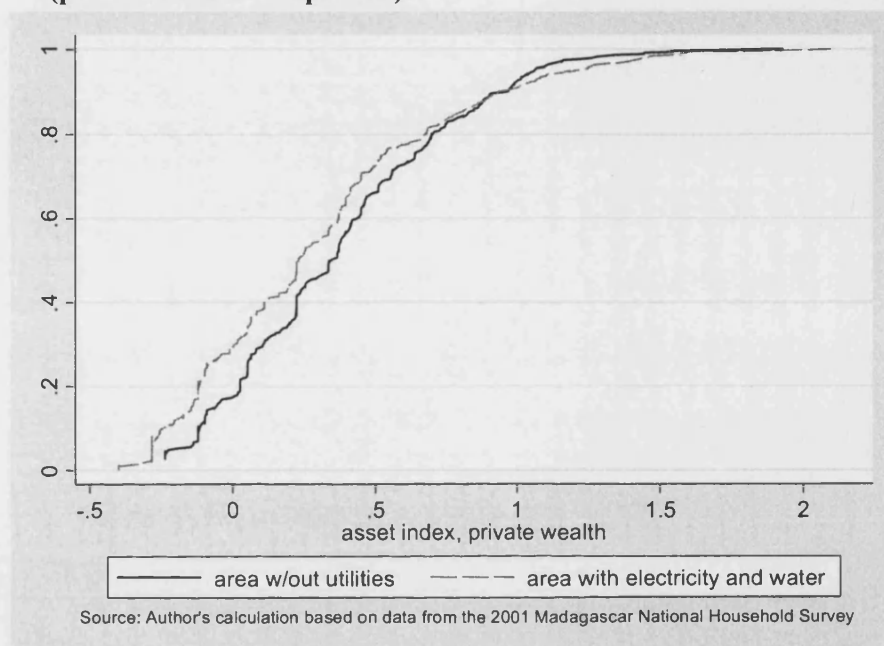
Intuitively, and given the results presented so far, one would expect that populations in communities with full service access always have higher mean scores on the asset index (here presented by positive values). As seen above, areas with better access to public services generally also tend to have higher levels of private wealth because they are usually among the economically better-connected communities (the choice of variables and the method used in constructing the asset index also increase the likelihood that scores on the two sub-components of the index will be correlated). In the table, these "normal" cases are represented by cells with positive values.

In contrast, pairs of regions where these differences are negative indicate communities that are disadvantaged in terms of service provision, but are located in economically better-off regions and enjoy such high levels of relative wealth that they bypass the level of private wealth in better-connected communities in the poorer regions of the island. In the table these cases, if statistically significant, are marked in dark grey.

A closer look at the geographic location of the regions with ambiguous orderings shows that the findings confirm existing evidence on the wealth differences between the north and the south, and the central highland and coastal areas of the island. Negative differences in area means tend to occur at the lower left hand side of the table, where communities with no service access in the wealthier northern and central regions of Madagascar (regions 1-3 and 9) are compared with communities with "full" service access in the poorer southern and coastal regions (regions 8, 12, 13, 16, 18 and 21). Note that this trend is confirmed by a clear pattern in the statistical significance levels of the estimated mean differences. At the left hand side of the table fewer of the reported positive differences are statistically different from zero, suggesting that many of the communities under comparisons have similar average scores. Again, this is against the intuition that communities with service access should be ranked above

communities with no service access. On the right hand side of the table a similar pattern is only observed in region 22 at the very south-east of the island.

Figure 3.3. First-order dominance, wealthy versus poor regions (private wealth component)

Source: Author's calculation based on data from the 2001 Madagascar National Household Survey
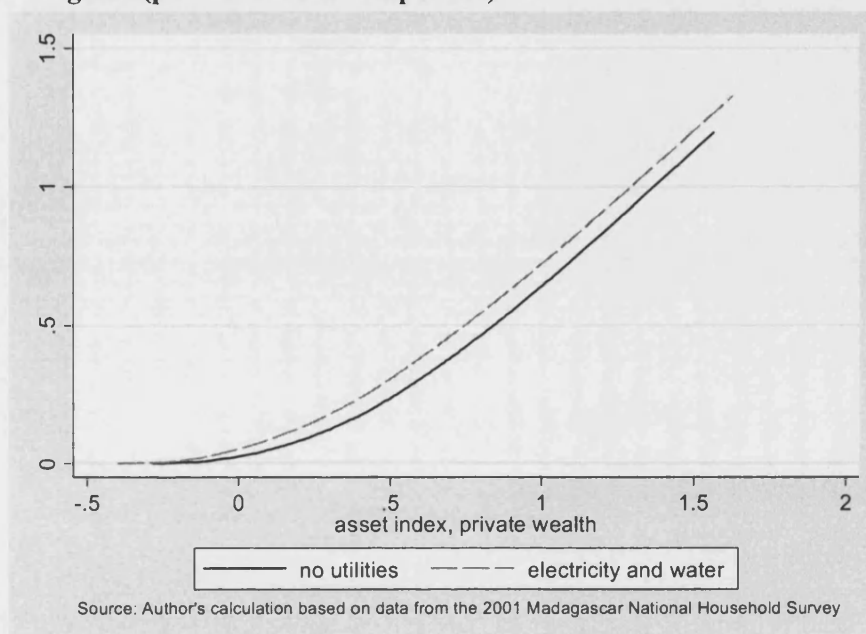
A more formal comparison suggests that these intraregional differences are large enough to lead to systematic reversals in the ordering of sub-populations. Figure 3.3 presents the results of a dominance test for only those pairs of regions with negative or similar mean scores in Table 3.7.[165] As can be expected, communities in poorer regions with the full range of public utilities tend to have higher incidences of private wealth deprivation than communities with no public utilities in the economically better-off regions. The curves cross eventually to re-establish the rank order which emerged from the national averages presented above. However, this occurs at a point in the distribution that is sufficiently high to suggest that the described differences in private wealth affect a considerable share of the population in the regions considered here.

---

[165] The comparison involves regions 1-3, 5, 9 and 22 in the group without access to utilities and regions 8, 11-13, 16, 18, 19 and 21 in the groups with access to utilities.

Figure 3.4. Second-order stochastic dominance, wealthy versus poor regions (private wealth component)

asset index, private wealth

——— no utilities   — — — electricity and water

Source: Author's calculation based on data from the 2001 Madagascar National Household Survey

Moreover, the ambiguity in the ranking disappears when the test is extended to second-order dominance, indicating that communities with higher levels of public goods provision in economically more deprived areas do worse than wealthier areas with lower levels of service supply (Figure 3.4). The second-order dominance test compares the integrals beneath the cumulative distribution curves presented in Figure 3.3. Intuitively, it provides an indication of the depth of private asset deprivation, similar to the poverty gap measure in the conventional income-based approach (see Deaton 1997: 162ff).

These findings lead to the conclusion that regional inequalities exist in the levels of private wealth in Madagascar that are so distinct that they begin to outweigh differences in livings standards that are due to the distribution of public services. From a practical point of view these rank reversals point to difficult normative trade-offs in the targeting of poverty alleviation programs. Policy makers will have to decide whether to prioritize areas that have an insufficient supply of basic public utilities, or whether they choose to target inequalities in the distribution of private wealth, which is also important when the linkages between

asset deprivation, vulnerability and chronic poverty are taken into account. The asset index and the methodology for welfare rankings presented here do not provide answers to these questions. However, they help to make the underlying choices more transparent and open to public debate.

3.6 Conclusion

This chapter has proposed and outlined a new and deliberately non-technical approach to the spatial analysis of wellbeing. The case study used to illustrate the basic concepts shows that the methodology identifies trends in the spatial distribution of wellbeing that are comparable to the findings of existing, consumption-based approaches. In addition, this methodology permits extending the spatial comparison of wellbeing from the sole dimension of private wealth into the domain of public services. In the case of Madagascar, this broader perspective is clearly preferable because, especially in rural areas, there are cases where the ranking of communities differs across the two dimensions. A one-dimensional approach would overlook these ambiguous cases and thus, possibly, lead to inappropriate policy responses in addressing existing inequalities in living standards.

The methodology is simpler than alternative multidimensional measures of poverty now increasingly used for spatial poverty comparisons. The community rankings presented here do not capture variations in the level of local service access within geographic areas—all comparisons within the dimension of public goods provision only distinguish between community-wide differences in the level of service supply. However, this simplification does not necessarily affect the wider significance of this approach. Particularly in low-income countries, levels of service supply often differ as much at the geographic as at the household level. In these settings, the non-provision of key public services in disadvantaged areas (such as water, sanitation, or transport) affects the level of

wellbeing of entire communities (for instance through lower health outcomes or reduced access to local markets), thus turning geographic inequalities in service provision into a relevant dimension for both welfare analysis and poverty alleviation policy.

It is particularly in low-income countries where the simplicity of the approach may prove to be of additional advantage. In my experience, all of the statistical techniques used here are mastered by local consultants and other experts with basic quantitative training (perhaps with the exception of the geographic dominance tests), and the commands are easily executable on most statistical packages (such as SPSS or Stata). In an ideal world, this would mean that indices and welfare comparisons of the type presented here could be applied by a larger number of research institutes, NGOs or aid agencies than is currently the case under the more demanding consumption-based approach to poverty profiling. If this wider participation in poverty research leads to more broad-based debates about the distribution of poverty and resulting policy priorities, then this simplicity in itself would be a welcome property of the approach presented here.

4 A group-based measure of capability inequality[166]

4.1 Introduction

Almost a quarter century after the publication of Sen's seminal publication *Commodities and Capabilities*, the capabilities approach (CA) continues to be clouded by concerns about its empirical practicability. For instance, a recent review on the issue of capabilities measurement acknowledges the CA's overall contribution to a more grounded conceptual foundation of human development. Yet, the review also concludes that challenges for measuring capabilities are "real and that the operational difficulties with the CA cannot be easily dismissed or ignored. ...the challenge is to link the main characteristic of the approach to a systematic but open-ended methodology to identify and assess those situations where capabilities were enhanced" (Comim 2008: 176).

The challenge of measuring capabilities can be divided into two separate problems. The first concerns the identification of qualitative dimensions of wellbeing such as education or health (what Sen calls functionings) in which a person's quality of life should be analyzed. As is often noted, in his own writings Sen consistently refused to define a list of relevant dimensions, preferring instead to leave the choice of such dimensions open to public debate or to local notions of the 'good life' (Sen 1993, 2000). This deliberate vagueness of the CA has created persistent queries on how the capability framework should be filled with content in concrete empirical settings. As a result, there is now a lively debate about possible dimensions of human development that should be included in the

---

[166] An earlier version of this chapter was presented at the annual conference of the Human Development and Capability Association, Lima, Peru. September 10-12, 2009. The paper was formally recognized as one of the three best contributions by a young researcher in the conference.

analysis of people's capabilities (Nussbaum 2000, Ranis et al. 2006), as well as on the procedures to select such dimensions (Alkire 2007, Comim 2008).[167]

The second measurement problem arises from the so-called counterfactual nature of capabilities. A central moral concern of the capabilities approach is that people should be able decide freely about the type of life they wish to lead. As a consequence, capabilities are defined over sets of alternative functionings from which agents *may* choose certain combinations according to their own values and conceptions of a meaningful life.

This aspect of capabilities, however, creates evident problems for empirical applications of the CA. By definition, an observer will only have information on the range of functionings that were chosen (achieved), while functionings that were not chosen remain unobserved. The implication is that researchers are generally unable to directly measure a person's capability set. Accordingly, most empirical applications of the CA to this point have focused on the evaluation of functioning achievements while actual studies of people's capability freedom are rather scarce.

The focus of this chapter is on the second problem—the difficulty of defining and observing a person's capability set. Drawing on recent literature that argues that individual levels of wellbeing and opportunities are usually strongly influenced by a person's social circumstances or 'group membership' (Roemer 1998, Stewart 2005), an index is presented that defines individual capability sets through observed group outcomes, using achievements in a person's group as a benchmark to approximate the range of outcomes and opportunities normally available to him or her. Differences in group achievements are then used to identify the degree of capability inequality in a society.

---

[167] Another aspect of this debate concerns the problem to measure human wellbeing in the multidimensional space. This is discussed in the recent literature on multidimensional poverty and inequality analysis (see for example Thorbecke 2007, Bourguignon / Chakravarty 2003).

The proposal may be justified both out of Sen's own writing on capabilities and a more recent literature, which argues for a more group-sensitive interpretation of the CA. For example, in his own writing on entitlements and capabilities, Sen acknowledges that in most societies, wellbeing opportunities of disadvantaged groups (such as women or ethnic minorities) are strongly constrained by vested inequalities in the distribution of relevant commodities and unfair social and political institutions (see Sen 1983, 1992, 2000, Sen / Dreze 2002). These arguments are complemented by a more recent literature, which suggests that inequalities in individual capabilities may be directly determined by group-based processes. For example Stewart (2005) has argued that group membership, as well as the characteristics of the groups that people are associated with, are critically important for individual capabilities, both because they may provide individuals with a sense of identity and (dis)empowerment and because they facilitate collective action and economic and social transactions between social agents (see also Teschl / Derobert 2008, Ibrahim 2006).

The chapter proceeds as follows. In the next section I review the existing literature on capability measurement, focusing in particular on approaches that rely on self-reported levels of satisfaction with capabilities (Anand et al. 2005, 2009) and structural equation modelling techniques (Krishnakumar/Ballon 2008). The section concludes that while each of the existing proposals capture important aspects of the capabilities framework, none of them satisfactorily describe the ideas of agency freedom and choice that were essential to Sen's initial formulation of the capability approach. Section 4.3 outlines a more refined notion of the idea of capability freedom, focusing in particular on the possibility that people's ability to make use of freedoms available to them may be constrained by their social contexts. Section 4.4 introduces group-based approaches to capability analysis and discusses how group-level information may be used to approximate individual capability sets and levels of individual functioning achievements. Section 4.5 presents a more formal outline of the proposal and explores how the proposed index may be used to analyze a society's degree of capability and functioning inequality over time. Section 4.6 addresses possible objections to the

216

methodology presented. Section 4.7 presents a case study to illustrate the approach, and the last section concludes.

4.2 Measuring functionings and capabilities

The formal structure of the capabilities approach is outlined in Sen (1985) and further developed in Kuklys (2005). A person's functioning achievement is a vector of valuable activities and states of being b_i, determined by

$$b_i = f_i \left(c(x_i) \mid z_i, z_e, z_s \right) \tag{1}$$

Where x_i refers to the commodities held by individual i, c $(.)$ is a function capturing characteristics of these commodities that determine their "use value" for individuals (for example the quality of a school), $f(.)$ is a person-specific conversion function that describes how 'efficiently' individuals turn commodities with given characteristics into functionings, conditional on personal attributes z_i (such as handicaps or personal abilities) and characteristics of their social and physical environment z_e, and z_s.

The shift to capabilities moves the focus of analysis beyond a person's achieved functionings to include also the effective freedom an agent enjoys in determining his or her way of life. Accordingly, a person's capability set is defined as a set of feasible functionings from which an individual can choose one combination of outcomes, depending on his or her own notion of a fulfilled life. In Sen's own words, "Capability is ...defined in the *space* of functionings. If a functioning achievement (in the form of an n-tuple of functionings) is a *point* in that space, capability is a *set* of such points (representing the alternative functioning n-tuples from which one n-tuple can be chosen)" (Sen 1993: 38 original emphasis). In formal terms, a person's capability set Q_i is expressed by the equation

$$Q_i (X_i) = \{ b_i \mid b_i = f_i \left(c(x_i) \mid z_i, z_e, z_s \right) \} \tag{2}$$

217

where X_i is a set of all relevant commodity vectors for the given capability set and the right hand side of the equation describes the functioning vector from which a person can choose her preferred combination of valuable doings and beings.

It is well-established in the literature that the empirical estimation of both a person's functioning achievements and her capability set is complicated by the fact that a variety of elements in equations (1) and (2) above remain unobserved in most practical research settings. For instance, in the equation of a person's functionings it is generally not possible to observe the characteristics of commodities nor the conversion functions with which individuals transform commodities into valuable outcomes. In the second equation, measurement problems arise from the counterfactual nature of capabilities. While an analyst may observe functionings that were actually achieved (chosen) it is in most cases impossible to observe alternative functionings that may have been accessible to the individual but were, for various reasons, not chosen. Thus, by definition, a person's full capability set will usually remain unobserved and has to be inferred through other procedures (Sudgen 1993, Comim 2008).

While both of these problems pose challenges for empirical applications of the CA approach, a broader consensus appears to have emerged on how to deal with unobservables in the estimation of functioning achievements than in the measurement of a person's capability set. The most common approach to the measurement of functionings that exists in the literature estimates the effect of commodity characteristics and individual or group-specific conversion rates with the help of an assumed functioning production function.[168] For example, a researcher wishing to estimate c (.) and relevant conversion factors f (.) in equation (1) above will typically take data on individual achievements in one or several functioning dimensions. Values for c (.) and f (.) may then be inferred from observed variations in outcomes across different population groups and

---

[168] These are similar to widely used earnings production functions in the field of human capital analysis.

across different combinations of commodity characteristics (at given levels of endowments), using regular multivariate regressions methods. For instance, in the case of functioning analysis the usual measurement equation is given by the formula,

$$b_i = f(y_i, z_i, z_e, z_s) + e_i \qquad\qquad (3)$$

where y_i describes household income or other relevant commodities (such as public services or assets), and e_i is an error term to capture unobserved determinants of household outcomes.[169] An example that applies this equation can be found in Kuklys (2005).

In the case of the estimation of capabilities a similar consensus has thus far not emerged in the literature. In fact, it is possible to distinguish two distinctly different approaches to measure an individual's capabilities. The first circumvents the problem of the non-observability of a person's choice set by drawing on people's own assessments of their level of wellbeing achievement. Respondents are asked whether they are satisfied with their quality of life or their accomplishment in a relevant dimension of wellbeing (the observed functioning or functioning set). Self-reported levels of satisfaction are then used as an indication of the quality of the choice/capability set initially available to them, based on variants of a utility function of the following form

$$U_i = u_i^b (b_i | z_i, z_e, z_s) \qquad\qquad (4)$$

where U_i is total utility of individual i, approximated by $u_i^b(b_i)$, the utility received from the achieved functioning under analysis (or a set thereof), conditional on various individual or context-specific conversion factors. Examples of this approach are found in Anand and van Hees (2006), who explore co-variations between self-reported satisfaction with personal capabilities and

---

[169] Note that functionings b are variably conceptualized as a directly observable variable or as a latent variable. In the latter case b_i is typically replaced by a score from a factor or principle component analysis on a range of relevant indictor variables. The notation follows Kuklys (2005:39).

personal characteristics such as gender, income and employment status;[170] Kuklys (2005) who uses income satisfaction data to estimate how disabilities or the presence of disabled persons in the household affects households' ability to transform income into utility; and Anand et al. (2005, 2009) who explore correlations between various measure of life satisfaction and sets of quality of life indicators derived from Nussbaum's list of basic capabilities.

The subjective approach to the measurement of a person's capabilities is particularly useful if the aim is to evaluate an aspect of human welfare that is often emphasized by Sen, namely the fulfilment of a person's agency goals and preferences. For instance, Sen notes in *Commodities and Capabilities* that it is a perfectly legitimate aim to study people's satisfaction with their quality of life, and that such assessments are best carried out on the basis of self-reported utility information rather than through the more problematic revealed preference approach (see Sen 1985).

However, evaluations based on subjective data are generally less suitable when the aim is to identify more objective variations in living standards across persons. For example respondents who have suffered long spells of deprivation may have adjusted their expectations to a lower life and therefore report a higher degree of satisfaction with their circumstances when the options they were able to chose from are actually inferior to those deemed acceptable by other better-off groups of the population (this is the well-known adaptive preferences problem).[171] By implication, this makes subjective data less suitable for interpersonal comparisons of wellbeing. As Sen himself notes in widely cited quote:

---

[170] The authors draw on a survey that was specifically designed for the purpose of their study. Capabilities and functionings are measured in the space of social relations, health, environment, personal happiness and achievement.

[171] Approaches that use subjective data may be able to 'filter out' more systemic variations in self-reported wellbeing from more idiosyncratic fluctuations due to personal tastes and predispositions with the help of regression-based controls for personal income or other relevant characteristics of the respondent. Yet, in so far as many social determinants of subjective welfare are still poorly understood it is likely that also these methods still overlook important personal constraints and life experiences that would be normally considered as unfair sources of disadvantage.

"The battered slave, the broken unemployed, the hopeless destitute, the tamed housewife, may have the courage to desire little, but the fulfilment of those disciplined desires is not a sign of great success and cannot be treated in the same way as the fulfilment of the confident and demanding desires of the better placed" (Sen 1987, p. 11).

The second broad approach to capabilities measurement that has emerged in the literature treats capabilities, and sometimes functionings, as latent variables, observed only indirectly through multiple indicators. Values for these unobserved variables are estimated with the help of data reduction techniques such as factor and latent variable analysis. These estimations are then integrated with causal models to map personal, group, or commodity characteristics to functioning achievements and capabilities, typically using multiple indicators, multiple causes (MIMIC) models and structural equation models (SEM).[172] For example, applications of an SEM model proposed by Krishnakumar (2007) and Krishnakumar and Ballon (2008) include a "measurement part" that estimates a person's functioning achievements from a number of observed wellbeing indicators (accounting possibly for some exogenous characteristics that may affect people's wellbeing achievement), as well as a 'structural' part that specifies relationships between individual and household attributes, capabilities and measured functionings. A person's latent capabilities can then be expressed as, and ranked by, the model's predicted capability scores, taking into account variations in person-specific conversion factors (Krishnakumar/Ballon 2008; Krishnakumar 2007).[173]

---

[172] These models have also been used to estimate functioning achievements (see for example Kuklys 2005).

[173] The exact specification of these models may vary from case to case. This applies in particular to interrelationships between the measurement and structural model equations that are allowed by these models (these interactions explain the simultaneous nature of these models). Note that it is the presence of a latent capabilities score in the structural model that explains the simultaneous nature of the model in Krishnakumar's and Ballon's model. The authors further assume that capabilities are interrelated. For instance a person's score on the latent knowledge capability is influenced by the score on the living standard function and vice versa.

However, while SEM models avoid problems of subjective data, it can also be argued that the latent variable approach only captures one particular aspect of a person's capabilities—an individual's ability to express and exercise her agency. In contrast, they are less suitable to address the idea of opportunity freedom that is implied in the idea of capabilities. For instance, in the SEM models developed by Krishnakumar and Ballon (2008), capabilities are defined as a person's 'knowledge' and 'living conditions' (housing and access to basic services), which are themselves determined by (and estimated from) observed 'exogenous causes' including access to relevant public goods, household wealth and family background. These capabilities in turn are hypothesized to have a causal effect on functioning achievements, along with other 'conversion' factors that diminish the effects of capabilities on achievement such as households' poverty levels or demographic characteristics (see the upper part of Figure 4.1).[174]

This definition of capabilities differs somewhat from Sen's initial conception of the CA where capabilities are defined in terms of a person's agency freedom, as captured by formula (2) above and graphically presented in the bottom part of Figure 4.1. In this initial conception of capabilities the causal chain goes from endowments to *feasible* functionings of the person, which then constitute the capability set from which a particular way of life may be chosen. A larger set, which offers a larger degree of choice among feasible functionings, is then ranked above any smaller set of functionings. While this conception of capabilities may be linked to people's ability to exercise their agency, this latter aspect of a person's capabilities is only a secondary outcome of the freedom of choice initially enjoyed from a capability set. In so far as the concern of analysis

---

[174] For example, according to the authors' estimations an increase of one standard deviation on the latent (normalized) knowledge capability variable leads to a 0.6 standard units increase on achieved levels of education and schooling for age, two of the functioning dimensions to be explained by the underlying structural model (Krishnakumar / Ballon 2008:1002).

is with people's degree of capability freedom, it is not at the centre of the evaluation (Sen 1993: 43).[175]

Figure 4.1. Two ways of conceptualizing capabilities
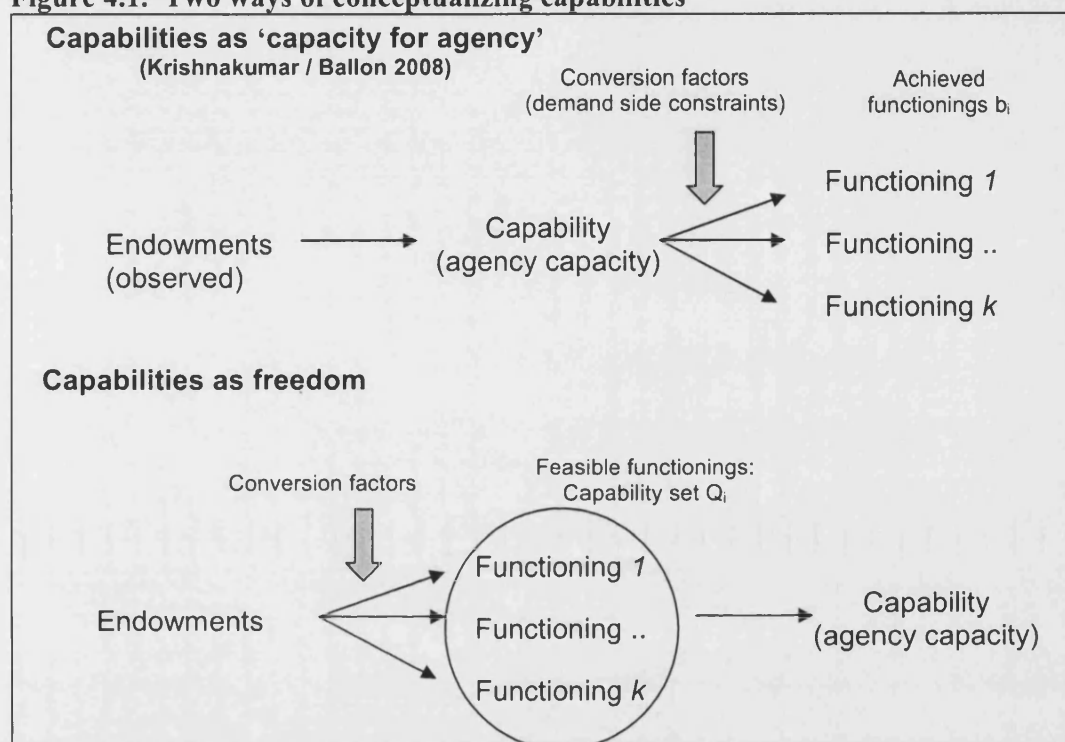
The top half of Figure 4.1 is a simplified version of a graph presented by Krishnakumar / Ballon 2008: 995.

---

[175] For example Sen often acknowledges that capabilities may directly contribute to a persons' wellbeing in the functioning space: "(F)reedom may have intrinsic importance for the person's wellbeing achievement. Acting freely and being able to choose may be directly conducive to wellbeing, not just because more freedom may make better alternatives available" (Sen 1993: 39). However, he draws a clear distinction between this aspect of a person's capabilities and the idea of capability freedom. Some of these differences are expressed in the distinction between elementary evaluation and set evaluation in Sen's own writing. Elementary evaluation involves the analysis of a capability set based on one or few of its possible elements (typically a person's achieved functionings). In contrast, set evaluation focuses on the size and content of a person's capability set, regardless of what functionings are actually chosen (see Sen 1993).

4.3 Towards a more refined definition of capability freedom

Even though the SEM approach may not offer a fully satisfactory operationalization of the idea of capability freedom, the conception of capabilities used by Krishnakumar (2007) and Krishnmakumar and Ballon (2008) indirectly points to some fundamental problems in Sen's reading of the CA. In the operational definition of a person's capabilities set, as it is outlined by equation (2) above, an individual's degree of capability freedom is primarily conceptualized in terms of the extent of choice a person has among various valuable functioning achievements (or combinations thereof). However, there is usually less emphasis on the processes, and their determinants, in which people convert these opportunities into actual function outcomes. More recently this has led to some criticism from proponents of more demanding conceptions of social justice that also take into account the possibility that the effectiveness with which people make use of opportunities available to them may be influenced by social and contextual factors beyond their control. For example Nussbaum, in her own work on the capabilities approach and gender inequality, has pointed out that 'habit, fear, low expectations, and unjust background conditions deform people's choices and even their wishes for their own lives' (Nussbaum 2000: 114). Accordingly, Nussbaum's proposal to operationalize the CA moves beyond simpler measures of people's opportunity freedom to include also information on their actual ability to lead self-determined lives. For instance, her list of basic capabilities includes such things as the capacity "to imagine, to think, and to reason—and to do these things in...a way informed and cultivated by an adequate education" (Nussbaum 2000: 78f).

Recent research on social and educational inequalities has provided empirical evidence in support of this revised reading of the capabilities concept. For example Burchardt (2009) finds in a study of educational aspirations and school choices among teenagers in Britain that student from less advantaged backgrounds tend to aspire to lower levels of education, even when respondents'

school attainments and the economic situation of their household improve sufficiently over time to permit their progression into higher types of education. Burchardt concludes that this poses significant challenges for the CA as it implies that differences in people's degree of capability freedom will not always just depend on the size of individual capability sets, but also on people's socially determined ability to aspire to valuable outcomes and ways of life. Again, this suggests that the definition of capability freedom needs to be revised to take into account interpersonal variations in the ability to turn available capabilities into valuable functionings. In her own words,

"The definition of agency freedom in particular, and capability in general, needs to be expanded to include the conditions in which these goals, aspirations and preferences are formed: a definition of capability we might call 'capability as autonomy', as distinct from a more conventional interpretations of capability as current substantive opportunity" (Burchardt 2009: 16).

However, it is important to note that this alternative interpretation of the capability concept also suggests potentially important changes to the way the notion of capability freedom is operationalized. While a 'conventional' reading of capability freedom would focus on the full range of capabilities formally available to an individual under the sum of political and social institutions of his or her society (for example the range of political rights and public goods provided by a government), an approach that is sensitive to the possibility of adaptive aspirations would limit itself to those alternatives that are realistic to be chosen by the agent, given her 'adapted' preferences. This leads to a more restrictive interpretation of a person's capability freedom. And it requires incorporating information on the possible preference structure and 'agency autonomy' into the evaluation. Again in Burchardt's words:

"Identical capability sets do not afford the same real chance, in practice, of achieving valuable functionings, and the reason for this difference is aspirations formed in previous unequal and unjust conditions. This presents a challenge not just to

evaluation based on agency goals but to evaluation based on wellbeing freedom too; in fact to any evaluation based on capability sets." (Burchardt 2009: 9)

In the following I argue that one solution to address these last two challenges to the CA may be found in recent literature on group-based aspects of capability inequality. Because there is wide agreement that both people's opportunities (capabilities) *and* their preferences and behaviours are often strongly pre-conditioned—and observed—at the level of social or spatial collectives, it may be possible to approximate people's capability sets and aspirations on the basis of observed differences in outcomes and actual choices between relevant groups (such as race, gender or neighbourhoods). To develop this proposal I begin with a brief outline of recent theories of group-related capabilities.

4.4   The capabilities approach and group-based inequalities

There is now wide agreement that group affiliations are an essential determinant of individuals' opportunities and capabilities. In a recent volume on interdisciplinary approaches to poverty and social inequality analysis, Grusky and Kanbur (2006:16f) argue that there are strong affinities between the capabilities approach and class-based analysis in sociology, given that both approaches tend to view inequality in terms of individual 'life chances', which are themselves conceptualized as the result of structural inequalities in the distribution of relevant endowments of assets, experiences and abilities. "In both cases emphasis is placed on the opportunities that a given set of endowments affords, thus leaving open the possibility that such opportunities may be exercised or realized in different ways" (Grusky /Kanbur 2006:17). They go on to note that a class-analytical lens may help to resolve many analytical challenges of poverty and inequality analysis that have arisen in the wake of the CA, including the difficulty of measuring wellbeing in the multidimensional space of functionings (see also Grusky / Weeden 2007).

The CA—in spite of Grusky's and Kanbur's claim about the affinities between the two approaches—does not commonly analyze inequality in terms of large aggregate macro classes. For instance, Sen himself prefers to study inequalities along broader demographic lines such as gender or race, arguing that discrimination based on physical characteristics like sex or skin colour often generates social differences that run across conventional class boundaries (see for example Sen 1992:117ff). However, Sen also recognizes the possibility that individual capabilities may be directly influenced by factors working at more aggregate levels. His earlier work on 'entitlements' acknowledges that people's access to relevant commodities may vary significantly across groups or regions of a country, depending on the fairness of its social, economic and political institutions (Sen 1983).[176] Similarly, in his subsequent work on capabilities he frequently noted that individual wellbeing is often influenced by geographic characteristics and the type and quality of public services provided in the vicinity, both because such locality-specific factors are directly relevant for the achievement of key functionings such as being educated, sheltered from the elements, or mobile, and because heterogeneity in physical environments and the quality of local public services often influences returns to private assets and investments (Sen 1992: 125ff).[177]

More recent literature on CA expands on this theme by focusing more specifically on how membership to specific social groups may affect individual capabilities. For example Stewart (2005) has argued that group membership, as well as the characteristics of the groups that people are associated with, are critically important for individual capabilities, both because social collectives provide individuals with a sense of identity and (dis)empowerment and because they facilitate collective action and economic and social transactions between

---

[176] This idea reappears with a focus on the distribution of procedural rights and political liberties in his more recent writing on capabilities and political freedom (see for instance Sen 2000).

[177] Evidence on the importance of such locality-specific determinants of wellbeing is also provided by the literature on economic geography or neighbourhood effects (see for example Kanbur / Venables 2005, Durlauf 2003).

social agents. Likewise, a growing body of literature now extends the CA to more sociological or 'relational' formats of analysis in order to assess how cultural, political and social institutions influence the level of wellbeing and wellbeing freedom enjoyed by different groups (Deneulin 2008, de Herdt/ Deneulin 2007, Teschl / Derobert 2008).[178]

A central argument of this chapter is that the types of group-level inequalities described by these new approaches may offer a solution to many of the problems of capability analysis described above. Consider first the problem of the non-observability of people's capability sets. While the full range of functionings individually available to a person will usually not be observable to an analyst, it will typically be possible to determine what groups are unfairly set back by formal or informal (social) structures of discrimination or other sources of disadvantage. Combined with appropriate quantitative analysis of the extent of resulting inequalities in relevant dimensions of wellbeing, group differences may be used by researchers to devise intuitively compelling approximations of the level of capability inequality that exist between relevant subsections of the population. For example, it is widely accepted that in the US or the UK personal opportunities in the dimensions of education or income are relatively more restricted for the non-white population or individuals from more impoverished neighbourhoods (see for example Durlauf 2003, Massey / Denton 1993). Additional quantitative evidence on the extent of these inequalities in relevant dimensions of wellbeing may then be used to infer the level of opportunity experienced on average by individuals from these groups in these two societies (see below).

---

[178] The increasing recognition of group-based dimensions of capability inequality has generated some debate as to whether the CA should treat preferences and claims to self-fulfilment of entire groups as independent concerns of capabilities analysis or whether it should continue to treat the individual as the normative centre of analysis (see e.g. Ibrahim 2006, Alkire 2008). Here I use group-level information primarily to approximate individual capabilities freedoms. As such my proposal has closer affinities to the more 'conventional' agency-centred approach to capability analysis.

The analytical link between a person's capability freedom and group-level outcomes may also help to address the second challenge to the CA, that is, concerns about differences in people's ability to transform opportunities into valuable outcomes. There is now wide agreement across the usual disciplinary divides that the type of socially conditioned aspirational changes and preference adjustments described above are often transmitted at the group level through processes of collective socialization and interactions among social peers (Coleman 1988). For example, so-called "membership" or social interaction theories demonstrate that a person's behaviour and his or her personal achievements at school or in the job market are a direct function of the characteristics and dominant forms of behaviour in a person's social milieu or group (Durlauf 2002, 2003 Durlauf / Young eds. 2000, Barrett ed. 2005). In the context of the CA a similar link has been drawn from group 'cultures' to individual behaviours. For instance, Stewart has argued that group cultures may influence the type of lifes people value (Stewart 2005, see also Deneulin 2008). This includes the possibility that differences in group behaviour may lead to systematic variations in the choices different people make when confronted with given sets of capabilities (including the possibility that certain groups may systematically underachieve if they have collectively lower aspirations).

In the evaluation of wellbeing these socially conditioned behaviours would be again captured when observed group differences are used to approximate individual capabilities. For example, if a group has been long suppressed and its members have begun to alter their preferences and aspirations, relevant differences in behaviour should be reflected in overall lower outcomes for that group, even if institutional barriers or gaps in the supply of relevant resources have been removed in the meantime.[179]

---

[179] In addition, the link to group-level averages may also be of interest when analyzing person-specific variations in the ability to transform opportunities into valuable outcomes. In many cases individual or household-level attributes will interact with group-level inequalities in ways that are only incompletely captured by purely individualistic frameworks that do not take account of such interactions. For example there may be structural inequalities in the distribution of relevant endowments with material assets or skills across groups, or people from different backgrounds may experience different returns on these endowments in the labour market. Relating individual

A final advantage of linking individual capabilities to group outcomes is that this approach may help to capture feelings of relative deprivation that are of central concern to Sen. In his own writing on poverty and inequality, Sen has repeatedly pointed out that people's subjective welfare will often depend directly on how their own wellbeing compares to that of people in their social environment (see for example Sen 1992, 2006). Provided that interactions within groups are more important than across groups, and that the group partitionings chosen for the analysis incorporate relevant social relations, it can be expected that the proposed linkage between individual achievement and group outcomes would capture such feelings of relative deprivation more accurately than would be possible under a framework of analysis that defines individual shortfalls only in relation to the average level of wellbeing in a society. Below I outline these ideas more formally.

4.5 The proposed approach

A useful template for the approach presented here may be found in a widely cited proposal for the measurement of opportunity equality by John Roemer (1998). A central concern of Roemer, as of many other proponents of the principle of opportunity equality, is to distinguish between constraints on individual achievements that are beyond a person's responsibility—what Roemer refers to as circumstance—and variations in outcomes that are due to personal effort and thus under the control of the individual. In Roemer's proposal the degree of unfair disadvantage in a society is directly approximated by the level of inequality between different 'circumstance' groups. A population for which the level of opportunity is to be equalized is divided into 'types' of individuals who face similar circumstances, approximated by their combinations of endowments,

---

achievements to group-level outcomes may capture such interactions and would thus reveal more accurately the full extent of disadvantage encountered by people who combine relevant personal attributes and group associations.

abilities and social backgrounds (including the forms of behaviour and preferences that typically come with them). Variations in average achievements across these 'types' are then taken as an indication of the degree of unfair social disadvantage in the society under analysis. In contrast, variations in achievements within 'types' or circumstance groups are associated with differences in personal 'effort' and are thus not considered to be of normative concern for analysts or policy makers (Roemer 1998: 13ff).

Roemer's approach may be translated into the language of capabilities with only minor adjustments. The degree of opportunity inequality between groups in Roemer's proposal may be equated with the level of capability inequality in a society, assuming that a direct link can be established between the group an individual belongs to and the range and quality of outcomes he or she can be expected to achieve under usual circumstances in a given societal context. A high degree of inequality between groups would thus indicate a high degree of capability inequality between the groups for which analysis is carried out.

Adjustments would only be needed when the approach is applied to the analysis of inter-personal variations in functioning achievement within groups. The discussion above suggests that there may often be relevant variability in the ability of different individuals to transform capabilities into functionings. Insofar as this inequality within groups is of moral concern for the evaluation, these within-group differences should be studied in more depth in a second step of analysis (see below).[180]

Expressed in formal terms, the approximated set of possible functionings b_i' that makes up a person's approximated capability set Q_i' is thus given by the range, or level of functionings achieved by individuals belonging to the same group as the agent whose level of capability freedom is being analyzed. The basic format of the measurement equation thus becomes:

---

[180] Note however that some authors prefer to focus only on between-group differences. See for example Stewart et al. 2005.

Capability set individual i = achieved functionings of group j;   for each $i \in j$

Or simply $Q_i' = b_j$ (5)

where b_j stands for the range or level of observed functionings of group j of which individual i is a member.

4.5.1   Measuring capabilities across groups

In the literature on opportunity inequality that followed Roemer's proposal, the distinction between individual effort and involuntary circumstances is often conceptualized in a framework of intergenerational mobility. Models of social mobility aim to identify to what extent people's permanent incomes or educational achievements are preconditioned by their family background, rather than their personal effort, luck or other idiosyncratic influences. Strong intergenerational correlations in outcomes are then interpreted as an indication of a limited degree of opportunity equality, while more variation in outcomes between parents and their children is taken as a sign that chances are more equally distributed. An example of such an approach can be found in the aforementioned study by Burchardt (2009), which uses panel data from the 1970s British Cohort study to investigate interactions between respondents' family background and their educational aspirations and schooling decisions over time (see also Bourguignon et al. 2007).

In reality, reliable data on parents' income or educational achievement will not always be available (for example, relatively few surveys in the developing world record information on the parental background of older individuals who have already left their parents' households). Accordingly, studies of opportunity inequality often need to rely on simpler cross-sectional designs that assess differences in social advantage directly from observed variations

across relevant circumstance groups.[181] Such a cross-sectional format also has strong parallels with the tradition of wellbeing analysis under the CA, which is often more interested in studying inequalities in individual or group capability inequalities at a given point in time.[182] As a consequence this format will also be adopted in this chapter.

In the cross-sectional format, differences in opportunity may be relatively easily traced with the help of group decomposable inequality indices, such as general entropy (GE) measures (Shorrocks 1980). For example, the Theil mean log deviation index is defined by[183]

$$GE = \sum_i f_i \ln\left(\frac{\mu}{y_i}\right) \tag{6}$$

Where f_i is the population share of individual i, y_i would be the outcome of individual i on the capability index and μ is the population average on the index. Following a well known transformation, this index may be decomposed into a between- and within-group inequality component as follows:

$$GE = \left|\sum_j g_j \ln\left(\frac{\mu}{\mu_j}\right)\right| + \sum_j GE_j g_j \tag{7}$$

where j refers to the circumstance groups defined for the purpose of analysis, g_j to the population share of circumstance group j, and GE_j to inequality within circumstance group j. The between-group inequality component is

---

[181] An alternative solution would be to restrict the analysis to children who still live with their parents (see for example de Barros et al. 2009). However, this restriction may lead to sample selection bias (by favouring households with children) and it omits differences in mobility among older individuals.

[182] See for example Roche forthcoming, http://www.capabilityapproach.org/pubs/1_2_Roche.pdf, last accessed July 13th 2010.

[183] The mean log deviation is just one index of the family of sub-group decomposable indices. It is used here because it places more emphasis on inequalities at the lower range of the distribution. The notation used here follows Elbers et al. 2008.

described by the first term and the within group component by the second term on the right hand side of the equation.[184]

It is easy to see how many of the basic ideas of the approach presented here would be captured by this decomposed format of the Theil measure. The between-group component of the GE measure is of central importance to the present proposal as it approximates the degree of capability inequality in a society. An increase of the between-group inequality component would point to more capability inequality in a society and a decrease to less capability inequality (with more weight assigned to larger population groups).

In contrast, the within-group component would capture variations in actual functioning achievement relative to the capabilities available to different parts of the population. As argued above, depending on the context of analysis, this part of the index could either be interpreted as a reflection of differences in the choices and effort people exert in transforming capability sets available to them into personal functioning achievements (following Roemer's initial proposal). Alternatively, it could be taken as an indication that there are additional interpersonal variations in the ability to turn capabilities into valuable outcomes. The determinants of these variations can then be identified in a second step of analysis (see below).[185]

---

[184] Note that a problem may arise from the logarithmic transformation of the share of individual or group achievements over the population/group mean. Such a transformation is not possible where this value is 0 (this arises when an individual or group has a total score of 0 on the index). In the case study presented below I deal with this problem by adding a constant of 1 to the index. This increases the overall degree of estimated inequality, but it does not affect the relative ranking of different circumstance groups. Moreover, provided that the amount of the added constant does not change over time, this procedure will not affect the evaluation of changes in the degree of capability inequality in a society.

[185] In this context, high levels of inequality within groups could be linked to increased incidences of relative deprivation following the line of argument outlined above. In both cases, the negative impact of these inequalities on a society's overall level of wellbeing would be reflected in the higher contribution of the within-group component to the estimate of overall inequality.

4.5.2   Constructing a capability index

In analyzing a person's degree of capability freedom, additional difficulties arise from the multidimensional nature of a person's capability set. One well known problem concerns the difficulty of choosing dimensions in which wellbeing freedom is to be analyzed. As already noted, in the literature there are lively debates about possible lists of functionings that should be included in the analysis (Nussbaum 2000, Ranis et al. 2006); as well as about the procedures to be adopted for choosing relevant indicators and dimensions (Alkire 2007, Comim 2008).

Another problem concerns the aggregation of information on people's multiple functionings into a synthetic measure of capability. While there are instances where it is preferable to analyze achievement separately, looking at one functioning at a time, evaluations of entire capability *sets* typically require making comparisons simultaneously across multiple feasible functionings. In this context multiple problems of aggregation arise, including the difficulty of assigning weights to each functioning and the need to deal with possible interdependencies between dimensions in the index (see Chapter 1, Decancq / Lugo 2008, Atkinson 2003).[186]

The literature on opportunity freedom often addresses the aggregation problem with the help of a simple 'counting procedure', where each element in the set is given the same weight. This format places the emphasis on the number of alternatives in the choice set, without imposing external restrictions on the normative weight of individual elements within the set (see for example Pattanaik / Xu 1990 and Alkire / Foster 2008 for a similar approach in the context of multidimensional poverty analysis).[187] This paper follows this approach.

---

[186] Rawls refers to this as the "indexing problem" (see Rawls 1971: 81).

[187] In Sen's own terminology this approach uses 'set evaluation' rather than 'elementary evaluation', whereby a set would be judged on the quality of its individual elements (see for example Sen 1993: 39). I will argue below that this approach may be justified on the grounds that the weighting of each alternative should be left to the individual making a choice, rather than to an external decision maker.

However, it may be noted that the idea of inferring inequalities of capability freedom from group-level information should, in principle, be compatible with various alternative aggregation procedures and weighting schemes.[188]

The underlying index would thus be constructed as follows. Take k dimensions of wellbeing that are thought to be relevant for human wellbeing in the society or population of individuals under analysis. Then aggregate information on these dimensions into a synthetic index by simply summing across all dimensions. Finally, evaluate the differences in outcomes achieved by the various circumstance groups defined for the purpose of analysis.[189] To make this measure comparable across contexts, the index may be further scaled by the total number of dimensions under consideration (k_j/k).[190] This transforms the index into a variable with a range from 0 to 1. An illustration of this procedure will be presented in the case study below.

4.5.3 Accounting for individual-level determinants of wellbeing

Even though the possible influence of group membership on individual capabilities is well established, persistent concerns remain about how much weight should be given to group-level inequalities in the evaluation of people's capabilities. Robeyns (2008) warns that measures that treat social collectives such as kinship groups or communities as the moral unit for the evaluation of capabilities may overlook important inequalities and oppressive structures within these social units. Examples of these types of inequalities are differences along the lines of gender or age, which are often substantive within groups (see for

---

[188] Intuitively, the aggregation question concerns how the analysis deals with the weighting of, and with interactions between, functionings *within* the set. However, it does not affect the more general possibility of approximating the set itself from group-level information. Note however, that the ranking of groups and of individuals within groups will be sensitive to the choice of the aggregation procedure.

[189] Note, however, that the method proposed here requires that aggregation take place first over dimensions and then across individuals. Other aggregation procedures would not permit subsequent interpersonal comparisons of capabilities (see for example Seth 2009).

[190] Intuitively, the scaling makes the index independent of the number of dimensions included in the analysis.

instance Nussbaum 2003). Alkire (2008) adds that group-specific notions of the good life may not always coincide with the preferences of individuals within a group. Both authors conclude that the equalization of individual wellbeing opportunities should always trump concerns about group-level inequalities in the evaluation of capabilities.

While concerns about possible tensions between group-related and individual capabilities are without doubt important, it is likely that they are primarily of relevance in cases where group-specific claims for the right to self determination conflict with individual liberties - an example is the opposition between certain religious doctrines and the ideal of gender equality. However, the tension between group and individual-specific interpretations of the CA should be of lesser concern in the context of the measurement of capabilities or the targeting of capability-enhancing policies. For instance, it is easily conceivable that a society would aim to address inequalities between socially or culturally defined groups, while at the same time focusing on interpersonal inequalities along the lines of gender, physical ability or age. In this case a methodology will be required that permits linking the evaluation of group differences described above to the analysis of interpersonal inequalities raised by the critics of the group-based approach.

A useful starting point for such an analysis may be found in the concept of a 'refined functioning', introduced by Sen on various occasions in his discussion of agency and wellbeing freedom (Sen 1985a, 1988, 1993). A refined functioning, as it is defined by Sen, describes a person's functioning achievement, taking into account information about the set of feasible functionings from which the outcome(s) in question was (were) chosen. In the present proposal this underlying set of feasible functionings would be approximated by the range of functioning achievements commonly attained by the members of the group of the individual whose wellbeing is being analyzed (b_j). A person's refined functioning B_i', may then be expressed as her actual

functioning achievement b_i, relative to the level of functioning achievement in his or her group b_j (representing the person's capability set).

Differences between individual functioning achievement and the level of wellbeing (capability) in the person's group may then be analyzed in a separate step, in order to identify person-specific attributes and characteristics that may explain variations in the ability of individuals to turn a set of available capabilities into actual wellbeing outcomes. Moreover, in so far as individuals evaluate their own living standard in relation to other members of their group, rather than to the whole society, this approach may also help to identify those persons who are most susceptible of suffering from experiences of relative deprivation and social exclusion. The case study at the end of this chapter will offer an illustration for such an analysis.

4.6 Possible objections

While the proposal presented above may offer a practicable solution for the problem of capability measurement, the methodology could be criticized on a number of accounts that should be addressed before I conclude this theoretical discussion of the proposal. At least four problems come to mind.

The first, immediate objection concerns the difficulty of defining what an acceptable level of capability should be. This proposal has been primarily concerned with the practical problem of observing and measuring a person's capability set. However, relatively little has been said about the choice of the capability thresholds against which the wellbeing of different groups and individuals should be analyzed. This is a potentially important omission because the evaluation of an individual's or group's capabilities will usually vary along with the notion of what constitutes an appropriate level of wellbeing opportunity in a group or society. For example is there a minimum level of capability that should not be undercut by any group in a society? Likewise, are there certain

levels of functioning achievements within groups that should be attained by all group members?

In this proposal a preference for a threshold has already been implicitly set with the use of the Theil inequality measure – in this measure the level of capability inequality between groups and the variability of functioning achievements within groups are evaluated, respectively, against the population or group average. However, in reality, a number of alternative benchmarks could be chosen. For instance, groups could be evaluated with respect to their shortfall to the maximum functioning achievement in the society. Likewise, the level of individual functioning achievements within groups could be analyzed against multiple points in a group's distribution of outcomes, such as the maximum achievement, the group median, or the 75th percentile.[191]

This chapter does not offer a theory to support a preference either for population or group-level averages or any alternative reference level. However, the following analysis will again rely on a number of robustness tests that help to mitigate the arbitrariness of the choice of the capability threshold. More specifically, the group level comparisons of capability inequality will be complemented by stochastic dominance tests, already used in Chapter 3 of this thesis. Where these tests point to unambiguous dominance of one group over another, group rankings may be established without the need to settle for a particular capability threshold. In a similar vein, in analyzing inequalities in functioning achievements within groups, I will assess individual shortfalls with respect to the group average, as well as a person's rank position within her respective group. Both of these procedures offer a more 'neutral' solution to the analysis of groups' and individuals' living standards and may help to detach the

---

[191] Note also that the choice of benchmarks must not necessarily be consistent across the two steps of analysis outlined above. For example it would be possible to base the analysis of between group capability inequality on intergroup averages (as would be the case under the Theil measure), but to evaluate persons specific variations in functioning achievement against alternative within-group benchmarks, such as the group median or the 75th percentile.

empirical analysis of the structure of capability and functioning inequality in a society from the more difficult normative task of setting the capability threshold.

The second objection concerns the difficulty of identifying adequate group partitionings for the measurement of people's capabilities. As argued above, much of the intuitive appeal of equating people's capability sets with observed group outcomes is based on the premise that the group partitionings chosen for analysis actually reflect relevant differences in individual opportunity. In most cases such an assumption may be confronted with a whole battery of well-known objections. For instance, group memberships may be overlapping or people may change group affiliations over time;[192] the meaning of social categorizations that underpin group definitions may be unclear or transient;[193] or observed group inequalities may reflect voluntary behaviours and value systems that would not normally be considered as unfair sources of disadvantage (for instance behaviours imposed by religious dogmas).[194]

This chapter does not aim to belittle these problems—in fact as argued before, the identification of relevant group definitions is a serious challenge for any form of research on collectively-mediated inequalities. However, problems of identifying groups should neither be treated as insurmountable nor should they preclude a more meaningful analysis of social inequalities. In many contexts there will be some agreement about which groups are unfairly disadvantaged— think about blacks in the US or the UK, 'untouchables' and Adivasi in India or

---

[192] Particular problems would arise if people were to change group affiliations to benefit from group-targeted welfare programmes (Stewart 2002).

[193] This applies in particular to more loosely defined networks and associations, but may also affect more seemingly invariant group markers such as ethnic identities (Stewart 2002).

[194] A related problem is that the statistical group averages used here to identify individual capability sets may be biased by a range of factors that are not genuinely related to group-level sources of disadvantage. For example, in particular in very segregated societies it is not uncommon that individuals of similar initial characteristic (such as lower income or ability) cluster in the same groups or neighbourhoods due to prior processes of population sorting. In such settings it is often difficult to determine whether estimated group differences reflect structures of disadvantage that are genuinely group-related or whether they simply capture differences in personal attributes or preferences that would not always be considered worthy of public attention (Manski 1993, 2000). However, even when such a selection bias applies there may still be an interest in targeting equalizing policies to particularly disadvantaged individuals in these groups or neighbourhoods.

indigenous minorities in many Latin American countries. Where doubts remain, the choice of a group partitioning may require further debate and background research to justify a chosen group partitioning, possibly going beyond purely statistical analysis to incorporate more qualitative assessments of the political and cultural institutions that determine inequalities in a society.[195] While this would place additional burdens on the researcher it would enable analysts to gain a more thorough understanding of the realities of the society that are being analyzed. Faithfulness to local social realities may come at the price of more complex research designs but it is certainly valuable in its own right.

The third, closely related objection is that the use of group-level information in the proposed approach may lead to the violation of a number of axioms commonly required of poverty and inequality measures in the welfarist tradition of wellbeing analysis. For instance, it is relatively well established that poverty and inequality measures that incorporate group level information typically do not satisfy the axioms of sub-group consistency, symmetry or transfers (Sen / Foster 1997, Subramanian 2009, see also Chapter 1).

In the present proposal violations of these axioms may at first glance not appear to be an issue because the aggregate-level comparisons of capability and functioning inequality are based on GE measures, which satisfy all the commonly required axioms. However, problems may arise when these indices are used for interpersonal comparisons of capability freedom. In the proposed approach, the evaluation of a person's capability freedom depends directly on the level of achievement in the group to which an individual is assigned. As a result, estimates of the degree of capability inequality in a society are going to change with any alteration of the underlying group means. This could be the case in

---

[195] It may also be possible that some of the problems with the statistical identification of group inequalities may be resolved on the basis of normative considerations. For example, inequalities in the level of public service provision are generally considered as unfair, even if there is evidence that such inequalities are partially the result uneven demand for relevant services.

alternative permutations of the data or (hypothetical) transfers of outcomes across individuals belonging to different groups (see Chapter 1).[196]

In the context of the present discussion little can be said in defence against this objection, except that violations of the usual axioms may—again—be justified if they are the price of an analysis that is more sensitive to relevant social realities in the societies under study. Sen himself has consistently argued that axioms such as symmetry or sub-group consistency should not be insisted on under all circumstances, especially if the incorporation of information on relevant social interactions would lead to more meaningful descriptions of the level of wellbeing in a society. For example his own inequality-sensitive 'S measure' of poverty knowingly violates core axioms in order to capture social interdependencies and instance of relative deprivation that would not be picked up by conventional individualist measures (Sen / Foster 1997). The approach proposed here adopts a similar position because it treats socially determined inequalities in capabilities and functioning achievements as sufficiently important aspects of social wellbeing to move them into the centre of the analysis.[197]

The last possible objection arises from the close affinity between the proposed measure of capability inequality and the concept of opportunity equality. The problem here primarily revolves around the question of how one should deal with human diversity in the analysis of people's capabilities. In the CA the recognition of human diversity is of central importance, both to account for variability in individual needs and to emphasize the possibility that there may be legitimate differences in the conception of the good life. Different persons value—and have reason to value—different things (Sen 1993). In practical terms this implies that evaluations of the living standard of people who live in different circumstances may require different 'capability benchmarks' and lists of

---

[196] Other victims may be the axioms of sub-group decomposability and sub-group consistency.

[197] It may be objected that Sen is highly critical of the family of sub-group decomposable poverty measures used here, precisely because they do not allow taking account of the possibility that relevant social interactions exist across groups (Sen / Foster 1997: 156ff). However, in the present proposal this criticism seems less relevant because partitionings are deliberately defined to maximize similarities of living conditions inside groups.

functionings (for example, it is realistic to assume that the range of desirable outcomes for a person will vary over a life time, along with factors such as age or family status).

The approaches to the measurement of opportunity equality that this chapter draws on, on the other hand, take a much narrower view on the question of human diversity. In most cases the aim of equality of opportunity is to equalize people's chances of achievements in a set of basic dimensions that are required to ensure a person's progress in life (for example having access to primary education and health). However, proponents of the principle of opportunity equality tend to be more sceptical about the need to satisfy people's claim to their right of self-fulfilment, assuming that preferences are potentially subject to the problem of 'expensive' or 'cheap' tastes (see for example Dworkin 1981, 1981a, 2000, Elster 1983; for an exception see Arneson 1989). Human diversity is only of concern where it unfairly disadvantages people in achieving outcomes in dimensions of wellbeing that are preconditions for their future progress. But there is usually no direct room, or need, to account for diversity in human wants.

While the distinction between equality in the space of opportunities and capabilities is thus clearly relevant on conceptual grounds, its practical importance will often vary along with the purpose and scope of analysis. One instance where the difference between the two concepts matters less is the evaluation of 'basic capabilities'. Sen in his own work has frequently argued that there are certain functionings that are so fundamental to human wellbeing that it is unacceptable that anyone should be denied access to them, no matter what the context (Sen typically mentions outcomes such as being well-nourished, educated or having the ability to live in a disease-free environment). Thus, where such basic capabilities are concerned a legitimate case can be made that personal opportunities to achieve satisfactory outcomes should be equalized in *all* of the relevant dimensions (Sen 1993: 40)—and this will typically require evaluating differences in wellbeing freedom against the same capability benchmark.

In other cases where differences in theoretically relevant capabilities are more important, the proposed approach may still be applicable if the universe of analysis is limited to sub-sections of the population whose living conditions are sufficiently similar to merit comparisons in the same space of capabilities. For example, it is reasonable to expect that people of the same age group have the same 'ideal' capability sets, but that actual capabilities within a birth cohort may vary along social or demographic lines such as race, gender or residential location. The methodology proposed here would capture such inequalities in individual capabilities.

4.7   Case study

To illustrate the proposed approach I return to my case study of wellbeing inequalities between Christians and 'traditional believers' in Madagascar. This is complemented by an additional partitioning across urban and rural lines, thus leading to a total of four groups over which capability inequalities are observed. While this breakdown by urban and rural areas is less fine-grained than the spatial comparisons in the preceding two chapters, there is strong evidence to suggest that this division captures significant differences in individual capabilities. As was argued before, in Madagascar, as in many other low income countries in sub-Saharan Africa, public expenditures for key public services such as education, health, transport or public sanitation are highly skewed towards urban areas, while administrative inefficiencies and leakages further reduce the supply of core services in the more remote regions of the island (World Bank 2004). It is well documented that these inequalities in public goods provision lead to substantive inequalities in a range of outcomes that are traditionally of concern to the CA, such as education, child care and mortality or asset wealth (Sahn/Stifel 2003, Razafindravonona et al. 2001). Likewise, poverty rates in rural regions tend

to be much higher than in urban areas (77% compared to 54%, respectively, World Bank 2006: 23, see also Romani 2003, Razafindravonona et al. 2001).[198]

In the following paragraphs I present estimates of capability sets and functioning achievements for the population of mothers between the age of 15 and 49 across these two partitionings, based on the proposal outlined above.[199] The data used for this analysis are drawn from three rounds of demographic and health surveys (DHS) which are available for Madagascar for the years 1997, 2003/4 and 2008/9.[200] DHS surveys are clustered random household surveys, stratified between rural and urban areas. For each household the surveys record detailed information on the health and nutritional status of women aged 15-49 and their children, along with a number of indicators on household wealth, housing quality, access to basic services, education, as well as basic characteristics of male household members (see Table 4.4 in the statistical annex to this chapter for descriptive statistics).

The indicators used in the analysis were chosen to capture dimensions of wellbeing that are primarily relevant for the female population in rural areas and towns of Madagascar.[201] The first set of variables relates to households' access to key services such as water, sanitation and electricity. While these cannot be considered valuable functionings in their own right, they may give an indication

---

[198] In his own work Sen has frequently argued that variations in the level of service publically provided may be directly interpreted in terms of capability freedom (Sen / Dreze 1989, Sen 1992). To use one of Sen's stock examples, a person's ability to avoid illness depends directly on the accessibility and quality of local healthcare provided, as well as on related interventions to improve public sanitation and generate healthier epidemiological and social environments. In a context like that of Madagascar, where inequalities in service supply are substantive, it is fair to assume that a significant part of observed differences in outcomes between urban and rural areas can be explained by resulting restrictions to individual capabilities along these lines.

[199] The restriction of the study universe to mothers of this age group was partially determined by practical reasons – it is the population group with the most detailed information in the DHS surveys used here. However, the wellbeing of mothers is clearly of interest in its own right.

[200] Data were collected by the National Statistics Institute of Madagascar (INSTAT) on account of Macro International, Inc. More information on the surveys can be found at http://www.measuredhs.com.

[201] The choice of dimensions and variables considered was somewhat limited by data availability, as the three rounds of the DHS survey used here do not include identical information across the two time periods. However, the variable used should give some indication of women's general quality of life.

of the hardship associated with daily household chores such as cooking or washing (as in many other countries, these chores rest primarily on the shoulders of Malagasy women). Other variables such as the respondent's literacy, her access to mass media and information about modern contraceptives are more direct indicators of a woman's ability to make informed choices about her life. The same probably applies to the availability of private means of transport, even though these may be used by male household members.[202] The final variable on child survival is likely to reflect general levels of health in a household and it should also capture the overall psychological wellbeing of the respondent. All variables are defined in binary format and take the value 1 if a woman meets the condition defined by the variable label. Population estimates for outcomes on these indicators for each of the four groups are presented in Tables 4.1a to 4.1c.

As argued above, in the following analysis these eight variables will be integrated into one common index using a simple counting procedure—in other words the index is created by taking the sum of the scores of the eight binary variables for each individual in the sample. The only exception are the three variables on household utilities, which were reweighted by a factor of one-third to ensure that dwelling-related characteristics are not given artificially higher importance in the resulting index. As discussed above, the index is then scaled by the total number of dimensions included in the analysis, leading to a variable that has a minimum value of 0 and a maximum score of 1.

While the use of this aggregation procedure makes the somewhat arbitrary assumption that all dimensions of wellbeing included in the index have the same normative weight, it has the advantage that the resulting index can be relatively easily related to the number of variables that go into the index—the maximum value a person can possibly obtain on the initial index is 6, reflecting the total number of functionings under consideration, while a completely deprived person would have a score of 0. Moreover, the assumption of homogenous weights

---

[202]For example, a validity test not reported here revealed that women with positive scores on the last three variables are less likely to accept domestic violence by their partner.

seems justifiable if one considers that the resulting index will be interpreted as an approximation of the choice set of a woman. In this context it seems reasonable that normative weights for each dimension should be set by women 'choosing' combinations of functionings, rather than on grounds of some external theoretical assumptions. However, as noted above, the indictors could be aggregated with the help of most other procedures proposed in the literature on multidimensional wellbeing analysis, without a substantive effect on the intuition of the proposed methodology.

In the context of the evidence on interreligious and spatial inequalities of wellbeing in Madagascar that was presented in the preceding chapters, the index proposed here offers two new angles of analysis. First, it provides a broader perspective on wellbeing differences across spatial and religious lines, beyond the narrower dimensions of education, private wealth and public utility access discussed in the previous sections of this thesis. Second, with the data available for this case study, it is possible to trace more recent trends in the evolution of capabilities and functionings than was feasible with the data used so far (the analysis in the previous chapters ended in the year 2001). This change in the time frame of analysis captures a time period that—with a brief interruption during a political crisis in 2002—is generally associated with relatively stable growth (Stifel et al. 2008, World Bank 2006). By extending the analysis to this time period it is therefore possible to assess whether and to what extent this improvement in living conditions contributed to a reduction of the structural wellbeing inequalities identified in the preceding chapters.

Table 4.1a. Group functioning scores. Population estimates 1997

	(1) Piped water	(2) WC or latrine	(3) Electricity	(4) Means of transport	(5) Literate	(6) Informed on contracept.	(7) All children alive	(8) Media access	(9) Functioning index	(10) Scored functioning index
Christian urban	0.621***	0.740***	0.416***	0.117***	0.808***	0.904***	0.704***	0.755***	3.880***	0.647***
	(0.038)	(0.040)	(0.027)	(0.012)	(0.023)	(0.021)	(0.015)	(0.027)	(0.102)	(0.017)
Non-Christian urban	0.217***	0.214***	0.090***	0.037**	0.275***	0.560***	0.590***	0.325***	1.961***	0.327***
	(0.063)	(0.063)	(0.029)	(0.016)	(0.055)	(0.076)	(0.039)	(0.060)	(0.219)	(0.036)
Christian rural	0.064***	0.416***	0.032***	0.062***	0.621***	0.724***	0.552***	0.467***	2.598***	0.433***
	(0.018)	(0.031)	(0.012)	(0.006)	(0.018)	(0.019)	(0.013)	(0.022)	(0.065)	(0.011)
Non-Christian rural	0.018***	0.059***	0.003*	0.020***	0.143***	0.469***	0.505***	0.189***	1.352***	0.225***
	(0.007)	(0.011)	(0.002)	(0.005)	(0.014)	(0.033)	(0.016)	(0.015)	(0.059)	(0.009)

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's estimates based on 1997 DHS data. N=5202

Table 4.1b. Group functioning scores. Population estimates 2003/2004

	(1) Piped water	(2) WC or latrine	(3) Electricity	(4) Means of transport	(5) Literate	(6) Informed on contracept.	(7) All children alive	(8) Media access	(9) Functioning index	(10) Scored functioning index
Christian urban	0.677***	0.841***	0.548***	0.328***	0.855***	0.967***	0.796***	0.863***	4.498***	0.750***
	(0.031)	(0.021)	(0.030)	(0.019)	(0.012)	(0.007)	(0.011)	(0.014)	(0.064)	(0.011)
Non-Christian urban	0.305***	0.403***	0.180***	0.183***	0.404***	0.755***	0.711***	0.487***	2.835***	0.473***
	(0.051)	(0.061)	(0.033)	(0.027)	(0.041)	(0.041)	(0.032)	(0.054)	(0.169)	(0.028)
Christian rural	0.176***	0.596***	0.134***	0.159***	0.629***	0.873***	0.707***	0.606***	3.276***	0.546***
	(0.045)	(0.039)	(0.033)	(0.020)	(0.030)	(0.023)	(0.021)	(0.034)	(0.128)	(0.021)
Non-Christian rural	0.011**	0.122***	0	0.067***	0.166***	0.566***	0.608***	0.264***	1.715***	0.286***
	(0.006)	(0.024)	(0)	(0.014)	(0.020)	(0.044)	(0.025)	(0.030)	(0.084)	(0.014)

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's estimates based on 2003/4 DHS data. N=5695.

Table 4.1c. Group functioning scores. Population estimates 2008/2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Piped water	WC or latrine	Electricity	Means of transport	Literate	Informed on contracept.	All children alive	Media access	Functionin g index	Scored functioning index
Christian urban	0.752***	0.848***	0.716***	0.391***	0.891***	0.991***	0.832***	0.876***	4.753***	0.792***
	(0.026)	(0.017)	(0.021)	(0.017)	(0.008)	(0.0019)	(0.008)	(0.011)	(0.034)	(0.006)
Non-Christian urban	0.519***	0.670***	0.446***	0.300***	0.639***	0.921***	0.845***	0.577***	3.827***	0.638***
	(0.075)	(0.071)	(0.071)	(0.041)	(0.036)	(0.018)	(0.027)	(0.053)	(0.133)	(0.022)
Christian rural	0.202***	0.623***	0.101***	0.276***	0.644***	0.961***	0.745***	0.575***	3.510***	0.585***
	(0.022)	(0.016)	(0.016)	(0.011)	(0.011)	(0.005)	(0.008)	(0.014)	(0.043)	(0.007)
Non-Christian rural	0.0528***	0.182***	0.008***	0.110***	0.223***	0.872***	0.733***	0.286***	2.305***	0.384***
	(0.011)	(0.020)	(0.002)	(0.009)	(0.011)	(0.012)	(0.012)	(0.017)	(0.036)	(0.006)

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Source: Author's estimates based on 2008/9 DHS data. N=12052.

The data in Tables 4.1a to 4.1c provide an overview of the evolution of outcomes in the individual dimensions of human functions considered here and on the synthetic capability index. The first, positive, result is that living conditions did indeed improve across the three rounds of survey data. Average outcomes increased across almost all of the variables and for each of the four groups.[203] These improvements are particularly consistent in the areas of transportation, media access, family planning, literacy and—a finding that is particularly heartening—the share of mothers who did not lose children to diseases or accidents. It appears that at least in the group averages reported here, economic growth did have a positive effect on the more qualitative aspects of people's living standards measured here.

However, the estimates presented also point to important and relatively stable inequalities in outcomes across the four groups under analysis. Outcomes on all of the functioning indicators differ significantly between urban and rural areas, with particular strong inequalities in the domain of public utilities, where coverage rates in rural areas lag considerably behind those in the larger cities. Moreover, there are again strong differences between Christians and non-Christians. Similar to my findings in Chapter 2, non-Christian women in this sample have significantly lower levels of literacy than Christians, regardless of whether they reside in urban or rural areas. Moreover, being a non-Christian in Madagascar implies that one also does consistently worse in most other dimensions, with particularly strong differences in the domain of public utilities, transportation and media access. On a more promising note, interreligious differences in child mortality are relatively small and are even reversed in urban areas in the last round of survey data.

Turning to the aggregate index, a similar picture emerges. In 1997, the score of non-Christians in rural and urban areas was only about half as high as that of Christians living in the same strata, while the score of non-Christians in

---

[203] The only exception concerns access to piped water and electricity, where coverage rates appear to have gone down for non-Christian rural households.
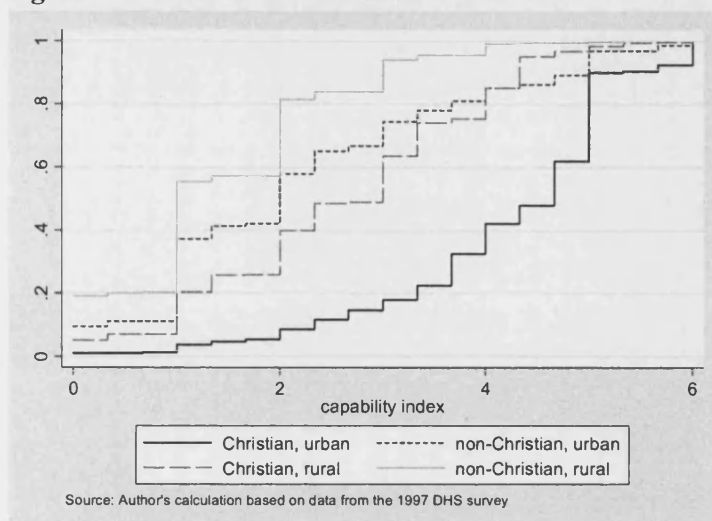
rural areas only accounts for little over a third of that of Christian in urban centres. Even though this gap narrows somewhat over the three time periods, inequalities across religions remain substantial throughout and often outstrip those between urban and rural areas. For instance, the aggregate score of a Christian woman living in a rural community in 1997 and 2003/4 is significantly higher than that of a non-Christian woman in the urban strata. However, in the last time period the ranking of these two groups is reversed, making the urban-rural partitioning the most important divide in the sample.

As argued above, group averages represent a potentially arbitrary choice of a reference point for the group level comparisons, and a number of alternative thresholds could be envisaged. Therefore, before I subject this index to a more formal analysis with the help of the Theil inequality measure, I will briefly test the robustness of group rankings to alternative thresholds. This assessment will rely on the same first order stochastic dominance tests already employed in a similar context in Chapter 3. Figures 4.2 to 4.4 plot the cumulative distribution of group level achievements on the full capability index for each of the three rounds of survey data.[204] The findings confirm that across all three years the level of capability deprivation of non-Christians clearly dominates that of Christians in each respective survey domain (urban, rural), independent of where the capability threshold is set. The dominance tests also show that even in the more extreme comparison between Christians in rural areas and non-Christians in urban settings, the latter group still dominates the former up to a point situated about two–thirds down the distribution of the capability index. As Table 4.1c already indicated, this pattern only changes in the latest round of survey data, where the dominance ordering between the two groups is already reversed after the first third of the capability index. Nonetheless, the ranking of the religious groups within each sampling domain appears to be sufficiently robust to justify the use of group averages in the following analysis.

---

[204] The graphs increase in gradual steps because the underlying capability index has less variation than conventionally used measures of achievement, such as income. Observations with equal outcomes on the capability index were assigned the same cumulative value to facilitate the interpretation of the graphs.

Figure 4.2. First order dominance tests 1997

Source: Author's calculation based on data from the 1997 DHS survey

Figure 4.3. First order dominance tests 2003/4

Source: Author's calculation based on data from the 2003/4 DHS survey
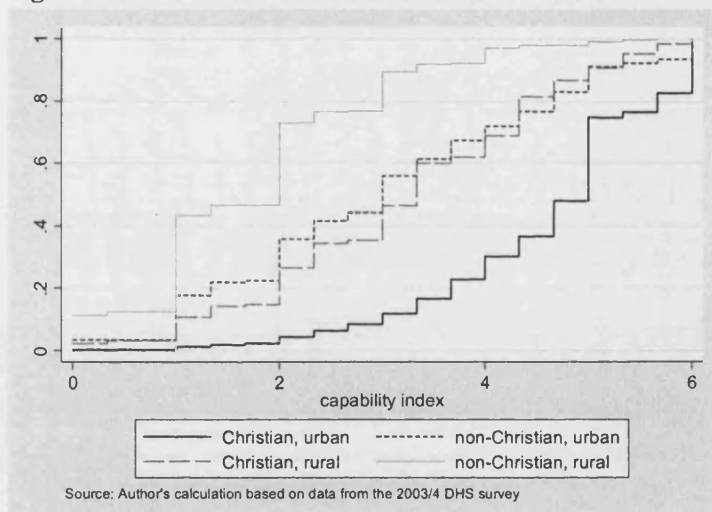
Figure 4.4. First order dominance test 2008/9

Source: Author's calculation based on data from the 2008/9 DHS survey

252
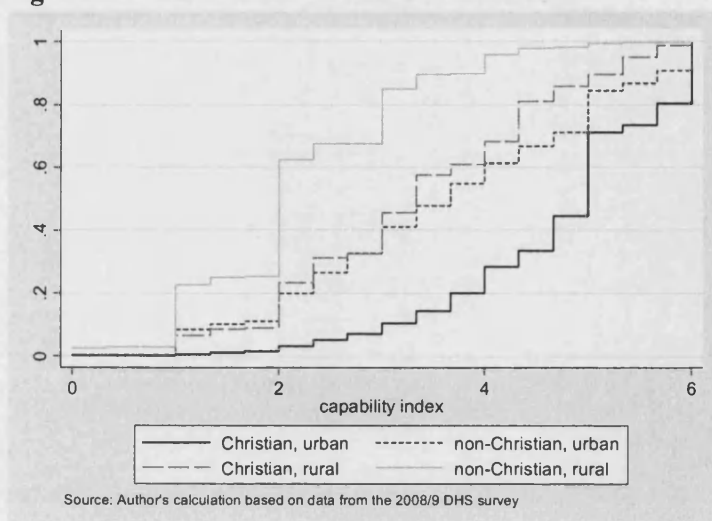
To analyse these outcomes more formally in terms of capability and functioning inequalities, I will draw on the Theil L or mean log deviation. This is a variant of the Theil family of inequality indices that is widely used in the literature on wellbeing inequality, as it gives higher weight to transfers in the bottom of the distribution ($\alpha=0$).

However, before this measure can be applied two problems need to be addressed. The first concerns the computation of the Theil measure over the wellbeing index used here. Because the calculation of the mean log deviation requires taking the log of the ratio of group to national averages, the measure does not allow estimating inequality for respondents with an index score of 0. This restriction would exclude women who are particularly deprived in their functioning achievement, and thus introduce a potential bias in the estimation of capability inequalities (see also Sahn/Stifel 2003 who encounter a similar problem when applying the Theil inequality measure to an asset index). In this chapter I deal with this problem by adding a constant of 1 to each observation in the sample. This change does not affect the rank order of respondents or groups as long as it is consistently applied to the sample. The added constant does, however, reduce the overall amount of inequality measured by the Theil index (see Sahn / Stifel 2003). I apply the Theil inequality measure in spite of this concern, because I am primarily interested in the relative level of inequality between the four groups, rather than in the absolute estimate of aggregate wellbeing inequality.[205] Yet, it is important to point out that the absolute estimate of inequality presented here will be sensitive to the size of the constant added.

The second problem concerns the estimation of the between-group inequality component of the Theil measure. The between-group share of inequality in the Theil index is estimated as a proportion of overall inequality.

---

[205] In fact, it has often been noted that Theil inequality measures are most appropriately used to track relative changes over time or groups. This is because inequality estimates produced by the Theil index do not have the same consistent interpretation across different case study contexts, unlike, for instance, the Gini index which only takes on values from 0 to 1. See for example Sen / Foster 1997.

Yet, as was already noted in Chapter 1, this procedure implies that the estimated share of between-group inequality will be artificially low—effectively group differences are compared against total interpersonal inequality, which is by nature larger than group inequality. Again this feature of the Theil measure limits the usefulness of the estimates produced here to evaluate the absolute extent of capability inequality in Madagascar (see Kanbur 2006, Elbers et al. 2008). As a consequence, the following discussion will focus on changes in the relative size of between-group inequalities over time.[206]

The estimates from the Theil measure indicate that the overall improvement in wellbeing recorded over the three time periods was accompanied by a reduction in the overall dispersion of living standards—the aggregate index decreases from 0.091 to 0.073 to 0.058 (Table 4.2). This reduction in inequality appears to be primarily driven by a decrease in inequalities within urban areas, a finding in line with existing evidence that economic growth experienced in the time period primary benefited the urban poor (World Bank 2006, Romani 2003). However, there also appears to be a strong reduction in inequality within the non-Christian population.

Table 4.2. Capability inequality estimates (mean log deviation)

	Total inequal	Total be-tween group	Total within group	Christ'-urban*	Non-Christ' urban*	Christ' rural*	Non-Christ' rural*	Be-tween group share	Within group share
1997	0.091	0.01	0.081	0.040	0.126	0.087	0.106	**0.112**	**0.888**
2003/4	0.073	0.008	0.066	0.027	0.093	0.071	0.096	**0.103**	**0.897**
2008/9	0.058	0.01	0.048	0.024	0.060	0.051	0.056	**0.173**	**0.827**

*Non-weighted. Source: author's estimates based on 1997, 2003/4 and 2008/9 DHS data.

In spite of this reduction in overall inequality, differences between the four group categories remain relatively stable. While the between-group

---

[206] Elbers et al. propose an alternative method that normalizes the between group component of inequality by the possible maximum share of between group inequality that could arise with the same group sizes and number of groups (Elbers et al. 2008). This method is not used here due to problems with the compatibility of the sampling frameworks of the three rounds of DHS survey data.

component decreases mildly between the two first rounds of survey data (0.01 to 0.008), it returns to its initial level in 2008/9. The overall share of between-group differences thus increases from around 11% in the initial period to over 17% in 2008/9.

In the context of the proposal put forward here this suggests that while the population in Madagascar did benefit from an overall improvement in living conditions, this change did little to alter the more fundamental inequalities in capability freedom along religious lines and the urban-rural divide. In Madagascar, one's chances of achieving a satisfactory level of wellbeing still strongly depend on where one lives and—assuming that religion is often passed on from parents to children (Chapter 2)—in what type of a household one is born. Recent economic growth was not sufficiently beneficial to poorer groups in the population to offset these structural inequalities in Malagasy society.

4.7.1   Interpersonal Functioning inequality

Independent of the computational particularities of the between-group component of the inequality index used here, the relatively high share of within-group inequality does indicate that a lot of variation in living conditions still exists within the four groups under analysis. While this may be related to the necessary crudeness of the group partitioning used here (in particular the high share of inequality in the non-Christian and rural sub-samples suggest that there are quite substantial differences in living standards inside these groups), it may also be related to more structural variations in the ability of Malagasy women to make use of the functioning opportunities available to them within their specific local contexts.

An analysis of women's "refined functionings", defined along the lines described above, may offer some indications about relevant individual and household correlates of these variations. To ensure consistency with the estimates

of within group inequality in the decomposition exercise above, the following analysis will use the group mean as the reference level for individual functioning attainments within the group. A woman's refined functioning score is given by each individual's achieved (observed) functioning divided by the group-specific mean $(b_i/\bar{b}_j)$. Women who, for various reasons, exceed the approximated capability threshold will have a value higher than 1.[207] Women who fall below the benchmark would have a value lower than 1.

To account for the arbitrariness that this choice of the capability threshold entails, I also estimated a woman's achievement as the individuals' rank position within the group. The signs and significance levels in this alternative specification are nearly identical to the findings reported below. The estimation results are presented in Table 4.6 in the statistical annex to this chapter.[208]

The DHS survey provides information on individual and household characteristics that may be used to explain personal variations on this index. In the case study I focus on household wealth, measured by an asset index that combines information on ownership of various household durables and housing quality,[209] as well as respondents' level of education, age, household size and composition, and geographic location (administrative province). In addition, I have tried to capture women's attitudes and their degree of self-determination,

---

[207] The notion that an individual may exceed the set of capabilities available to them does, of course, seem counterintuitive. In this case one of the reasons for this shortcoming is the rather rough definition of the underlying sub-groups used in the estimation of a person's capability set. As I have argued before, more accurate group definitions may lead to much more distinct group differences that would help to mitigate such problems.

[208] The only exceptions are minor changes to the significance levels on some of the controls for geographic location and a woman's ability to make decisions on daily purchases (see below). The alternative model was estimated with the tobit estimation method in order to account for the censored nature of the rank variable.

[209] See also Sahn/Stifel 2000, who construct a similar index using DHS data. The wealth index used here represents the predicted score on the first component of a principle component analysis, carried out over ten variable describing floor quality, cooking materials, and ownership of household durables. The first component had an Eigenvalue of 4.2 and explained over 40% of the total variance in the underlying correlation matrix. Note that while the index excludes indicators used to identify capability sets above, two of the variables on household durables (ownership of a TV and refrigerator) may be strongly correlated with the indicator variables describing access to electricity and media. However, excluding these variables had no effect on the signs and significance levels of the regression estimates reported.

approximated by respondents' self-reported degree of participation in decisions about daily household purchases (see table 4.5 in the annex for descriptive statistics). While the causal direction between some of these variables and a woman's functioning achievement cannot always be clearly established, the estimation results may point to covariates of actual wellbeing outcomes that are indicative of possible determinants of the variability of functioning achievement observed within the relevant sub-groups.

The results of a simple linear regression of the refined functioning score on these explanatory variables largely confirm expected relationships between women's functioning achievement and their socio-economic background (Table 4.3).[210] Household wealth and the level of education of the respondent all have a strong and robust effect on the functioning achievement of woman in all four groups. These effects are larger in the rural sub sample and—with the exception of primary education—increase for the non-Christian population.[211]

The results on the interaction between women's attitudes and their functioning achievements are less clear. Women who report that they are able to decide for themselves about daily expenditures also tend to have higher levels of functioning achievement. However, this effect only passes the commonly accepted significance levels in the two Christian sub-samples. This suggests that there is some positive association between the degree of autonomy a woman enjoys in her daily life and her functioning outcomes in other domains of wellbeing that is more specific to the Christian than to the non-Christian population.

---

[210] Estimates were carried out for the 2003/4 round of the DHS survey only.

[211] The strong effect of education may be in part explained by the evident correlation between a respondent's level of schooling and her literacy. However, the effect was robust when literacy was excluded from the index.

Table 4.3. Determinants of functioning achievement, pooled and sub-sample estimates

	(1)	(2)	(3)	(4)	(5)
	Full sample	Christian urban	Non-Christian Urban	Christian rural	Non-Christian rural
Wealth index	0.109***	0.067***	0.160***	0.127***	0.273***
	(0.008)	(0.003)	(0.012)	(0.013)	(0.048)
Makes decision on daily purchase	0.051**	0.031**	0.069	0.047*	0.118
	(0.025)	(0.015)	(0.058)	(0.026)	(0.078)
Age	-0.004***	-0.003***	-0.003	-0.004***	-0.006**
	(0.001)	(0.000)	(0.002)	(0.001)	(0.002)
Primary education	0.295***	0.246***	0.199***	0.395***	0.322***
	(0.029)	(0.018)	(0.053)	(0.035)	(0.050)
Secondary or higher	0.405***	0.337***	0.409***	0.545***	0.960***
	(0.031)	(0.018)	(0.071)	(0.037)	(0.160)
Household size	0.009**	0.008***	0.008	0.009	0.008
	(0.004)	(0.002)	(0.011)	(0.006)	(0.012)
Number of children < 5	-0.002	-0.011**	-0.030	-0.007	0.033
	(0.009)	(0.005)	(0.026)	(0.012)	(0.030)
Urban	-0.318***	(dropped)	(dropped)	(dropped)	(dropped)
	(0.017)				
Fianarantsoa	-0.024	-0.009	-0.049	0.003	-0.250**
	(0.053)	(0.016)	(0.113)	(0.067)	(0.100)
Tamatave	0.049	0.049**	0.053	0.036	(dropped)
	(0.058)	(0.021)	(0.104)	(0.068)	
Mahajunga	0.087	0.008	-0.042	-0.064	-0.107
	(0.064)	(0.013)	(0.083)	(0.062)	(0.120)
Tulear	-0.031	-0.043	-0.110	-0.118*	-0.188*
	(0.052)	(0.026)	(0.090)	(0.061)	(0.095)
Antsiranana	0.264***	0.052	0.024	0.075	0.318**
	(0.077)	(0.036)	(0.082)	(0.083)	(0.122)
Constant	0.938***	0.683***	1.014***	0.846***	1.538***
	(0.049)	(0.025)	(0.134)	(0.057)	(0.165)
Observations	5690	3138	343	1548	660
R-squared	0.393	0.532	0.683	0.569	0.325

Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. No schooling and the province of the capital Antananarivo are the omitted categories for the education and province dummies. Source: author's estimates based on 2003/4 DHS data.

On a final note, it is telling that older women in general have lower functioning outcomes, a promising finding which suggests that there may have been a progressive, structural improvement in the ability of Malagasy women to

attain higher standards of living (see also Chapter 2). However, while robust in three of the four sub-groups, this effect is negligible in absolute magnitude. The remaining controls at the household or geographic level do not have a consistent effect on the level of functioning achievement.[212]

4.8 Conclusion

This chapter aimed to make two contributions to the literature on capabilities measurement. The first concerns the operationalization of the idea of capability freedom. While a person's capability set is generally not directly observable, this chapter has argued that an idea about the degree of capability inequality in a society can be obtained by monitoring systematic differences in functioning achievement across groups. In many settings the effective capabilities a person enjoys in his or her society are directly influenced by the attributes and social status of the group he or she is associated with. Group-based discrimination or group-specific cultures and behaviours are evident examples of the transmission mechanisms behind this relationship. The chapter has argued that because group differences are generally easier to observe than a person's set of individually feasible functionings, wellbeing differences at the group level may be used to approximate the degree of capability freedom in a society.

The second contribution concerns the often difficult relation between group-based and individual-centred interpretations of the CA. In the recent literature on the CA there is a growing debate on the role of group-level information in the evaluation of societies' degree of capability equality. Some have argued that because groups are instrumentally and intrinsically relevant for individual wellbeing, group-level inequalities in functionings and capabilities should be given more weight in the assessment of people's capabilities (see for

---

[212] Additional robustness tests excluded outliers on the dependent variable as well as a tobit estimation to account for the censored nature of the dependent variable. None of these tests changed the signs or significance levels of the results reported here.

example Stewart 2005, Ibrahim 2006). Others insist that the CA should continue to place the individual at the centre of analysis, in order to account for possible tensions between individual and group-level interests, such as conflicts between groups' claims for the right to self-determination and gender rights (see for example Nussbaum 2003, Robeyns 2008, Alkire 2008).

This chapter has argued that at least in the context of capability measurement, concerns about group- and person-specific capabilities are often complementary, and that they should be addressed under the same framework of analysis. Drawing on Sen's idea of a 'refined functioning,' a method has been presented that defines an individual's functioning achievement relative to the range of capabilities typically attained by members of his or her group. This method captures possible feelings of relative deprivation that arise when individuals fall short of the living standards in their immediate social context. Moreover, when applied to a separate analysis of the determinants of functioning achievement, it may help to identify additional, person-specific variations in advantage that would be omitted under the more aggregate group-level comparisons in the first part of the proposed approach. For example in the case study presented in this chapter, variations in functioning achievement within groups defined by religion or urban-rural status tend to be strongly associated with people's level of schooling and family wealth. This underlines the fact that also under the group-sensitive perspective adopted here, there is still place for individually targeted interventions built around policy objectives such as the provision of basic assets or education.

In spite of its easy applicability, the approach has a number of caveats. Group divides, which are used to infer the degree of individual capability freedom in this proposal, often only have 'salience' in the cultural and political context of their countries. Conclusions about the extent of capability inequality developed under this approach therefore tend to be specific to the societies in which they are being produced, while their comparability across contexts or societies is likely to be more limited. Moreover, the way capability inequalities

are being estimated introduces some limitations on the comparability of the measure across case study contexts. For instance, the fact that individual capabilities are inferred from group means implies that the estimates of capability inequality produced by the approach proposed here may violate a number of axioms commonly required of poverty and inequality measures (such as the symmetry and transfer axiom). Likewise, the fact that the degree of capability inequality in a society is estimated with the help of standard sub-group decomposable inequality measures such as the Theil index introduces well-known restrictions associated with these indices which limit the comparability of absolute estimates of capability inequality under the method proposed here.

However, independent of these caveats, the approach outlined in this chapter does appear to offer a useful tool to monitor differences in capability freedom in cases where the context of analysis is well defined. In the case study of Madagascar presented in this chapter, the approach allows us to identify structural inequalities in capabilities across religious and urban-rural lines that persist in spite of a general improvement in local living standards over the past decade. For instance, urban-rural differences in wellbeing are altered only marginally over the time period for which data are available. These differences remain particularly strong in dimensions that would theoretically be easily amendable by government interventions, such as local literacy rates or households' access to utilities like water, sanitation or electricity.

Likewise, differences between religious groups that were already identified in the second chapter of this thesis are again substantive. Non-Christians in the sample analyzed here have again significantly lower literacy rates than Christians, regardless of whether they reside in urban or rural areas. Yet, being a traditional believer in Madagascar also implies that one is more likely to do considerably worse in a range of other relevant dimensions such as access to public utilities, media or transportation.

Both of these findings suggest that much more effort is required to ensure a more equitable distribution of opportunities for wellbeing in Madagascar. The method proposed here may offer a first and preliminary tool to guide interventions in this direction.

4.9 Statistical annex Chapter 4

Table 4.4. Descriptive statistics

	1997		2003/4		2008/9	
	mean	sd	mean	sd	mean	sd
Christian urban	0.26	0.44	0.55	0.50	0.21	0.41
Non-Christian urban	0.03	0.18	0.06	0.24	0.02	0.14
Christian rural	0.45	0.50	0.27	0.44	0.51	0.50
Non-Christian rural	0.26	0.44	0.12	0.32	0.26	0.44
Piped water	0.23	0.42	0.46	0.50	0.27	0.44
WC or latrine	0.42	0.49	0.67	0.47	0.48	0.50
Electricity	0.15	0.36	0.37	0.48	0.19	0.39
Means of transport	0.07	0.25	0.25	0.43	0.24	0.43
Literate	0.55	0.50	0.70	0.46	0.56	0.50
Informed on contracept.	0.73	0.45	0.89	0.32	0.94	0.25
All children alive	0.59	0.49	0.75	0.43	0.76	0.43
Media access	0.49	0.50	0.71	0.45	0.53	0.50

Table 4.5. Descriptive statistics functioning analysis (2003/4)

	mean	sd
Relative functioning score	1.00	0.39
Wealth index	-0.23	2.12
Makes decision on daily purchase	0.90	0.31
Age	32.39	8.66
Primary education	0.43	0.49
Secondary or higher	0.40	0.49
Household size	5.44	2.49
Number of children < 5	1.14	1.01
Urban	0.61	0.49
Fianarantsoa	0.16	0.37
Tamatave	0.15	0.36
Mahajunga	0.11	0.31
Tulear	0.13	0.34
Antsiranana	0.10	0.29

Table 4.6. Determinants of respondent's group-rank position. Tobit estimates

	(1)	(2)	(3)	(4)	(5)
	Full sample	Christian urban	Non-Christian Urban	Christian rural	Non-Christian rural
	Rank	Rank	Rank	Rank	Rank
Wealth index	0.110***	0.067***	0.161***	0.128***	0.286***
	(0.009)	(0.003)	(0.012)	(0.014)	(0.050)
Makes decision on daily purchase	0.053**	0.031**	0.078	0.048*	0.130
	(0.025)	(0.015)	(0.067)	(0.026)	(0.080)
Age	-0.004***	-0.003***	-0.003	-0.004***	-0.007**
	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)
Primary education	0.309***	0.247***	0.202***	0.405***	0.347***
	(0.030)	(0.018)	(0.054)	(0.036)	(0.053)
Secondary or higher	0.418***	0.338***	0.410***	0.555***	0.986***
	(0.032)	(0.018)	(0.072)	(0.038)	(0.167)
Household size	0.009**	0.008***	0.007	0.010	0.010
	(0.004)	(0.002)	(0.011)	(0.006)	(0.012)
Number of children < 5	-0.002	-0.011**	-0.027	-0.007	0.037
	(0.009)	(0.005)	(0.029)	(0.012)	(0.033)
Urban	-0.317***	(dropped)	(dropped)	(dropped)	(dropped)
	(0.018)				
Fianarantsoa	-0.023	-0.009	-0.050	0.006	-0.280***
	(0.054)	(0.016)	(0.118)	(0.069)	(0.102)
Tamatave	0.053	0.050**	0.056	0.039	(dropped)
	(0.059)	(0.021)	(0.106)	(0.069)	
Mahajunga	0.086	0.008	-0.039	-0.063	-0.129
	(0.067)	(0.013)	(0.084)	(0.063)	(0.128)
Tulear	-0.037	-0.043	-0.113	-0.118*	-0.227**
	(0.054)	(0.026)	(0.092)	(0.063)	(0.100)
Antsiranana	0.267***	0.052	0.0263	0.076	0.310**
	(0.078)	(0.036)	(0.083)	(0.084)	(0.124)
Constant	0.927***	0.681***	1.006***	0.838***	1.568***
	(0.050)	(0.025)	(0.138)	(0.058)	(0.174)
Sigma	0.372***	0.176***	0.293***	0.301***	0.573***
	(0.010)	(0.004)	(0.015)	(0.011)	(0.026)
Observations	5690	3138	343	1548	660

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. . Source: Author's estimates based on 2003/4 DHS data.

5 Conclusion

The literature on wellbeing and opportunity inequality has traditionally treated the individual as the normative and analytical focus of analysis. In the typical case, a person's opportunity is defined on the basis of individual or household attributes, such as education, parental background or asset ownership. The level of advantage actually enjoyed by the agent is then approximated by the sum of returns to the attributes and endowments available to the individual.

In reality, differences in personal advantage are not only determined by individual attributes and often substantial inequalities in opportunities will be observed at more aggregate levels of social organization. In many societies individuals from poorer groups or regions suffer persistent disadvantages, both with respect to their ability to access to important assets and the returns they receive for their labour. These inequalities are typically further exacerbated if the poor are highly segregated or if disadvantaged groups are concentrated in regions with less favourable geographic attributes or lower levels of public service supply and market access.

I have argued in this thesis that the existence of structural disadvantages of the type just described provides a strong case for an analytical approach that is more sensitive to relevant spatial and group-related inequalities in a society. A group-based approach, as defined here, would aim to identify structural inequalities in wellbeing opportunities that were overlooked by more conventional individualistic formats of analysis. This approach would typically entail explorative and comparative evaluations of the relative 'salience' of alternative group partitionings. Moreover, it would integrate detailed assessments of relevant social and historical contexts with more systematic quantitative estimates of the extent of inequality between groups. Results would then be used to identify new targeting priorities and to inform the design of redistributive welfare policies (Kanbur 2006, Stewart et al. 2007, 2009, see also

Chapter 1). Likewise, group-level information may be employed to identify differences in people's wellbeing freedom, which are traditionally more difficult to measure under conventional individualistic frameworks of analysis.

The thesis has illustrated the usefulness of the proposed group-based approach at both empirical and conceptual levels. Chapter 2 has presented a detailed analysis of educational inequalities in Madagascar. In this study, comparative analysis along alternative group divides has led me to move beyond more widely studied breakdowns along urban rural and ethnic lines to focus on inequalities between the two largest religious groups in the island, namely Christians and traditional believers. While differences along these religious lines are smaller than those between the major ethnic groups when household consumption is used as the only indicator of wellbeing, substantive inequalities emerge when the domain of comparison moves to education. For example, children of household heads who practice 'traditional' belief systems, have a likelihood of primary school enrolment that is only approximately half as high as that of children from Christian households. Further, the educational attainments of non-Christians in older age cohorts tend to be much lower than those of Christians. The new comparison presented here also reveals new patterns in the spatial distribution of wellbeing outcomes that had not emerged in this way from previous research. In particular the population in the southern highlands of Madagascar, which are ranked among the poorest regions by most conventional accounts of poverty, tend to have educational achievements that are well above the nation's average.

Further contextual and econometric analysis suggests that these inequalities have historical origins that precede more contemporary determinants of wellbeing at the individual or household level. In the Malagasy context, where the level of domestic migration is comparatively low, the current distribution of Christians and traditional believers still largely reflects differences in the outreach of Christian missionaries, who were particularly active in the late 18th and early 19th Century. Christian missionaries were, however, also the only providers of

formal education during much of the pre-colonial and colonial era. This has created considerable inequalities in the provision of formal education, which were reproduced over time by a very uneven supply of public and especially private schooling. Today, household data suggest that the better school provision and higher rates of human capital accumulation associated with the historical presence of Christians in an area still account for a large part of educational inequalities in the population, even when a person's own religious background or other relevant household attributes are taken into account.

Both of these findings have practical implications demonstrating the potential relevance of interreligious inequalities in the Malagasy policy context. Historically uneven school provision plays a strong role in explaining current educational inequalities between Christians and traditional believers. This finding suggests that improvements in the educational attainments of non-Christians requires considerable investments in the quality and accessibility of schools in the more disadvantaged rural areas inhabited by this group. The result has potentially positive implications for policy makers, as geographically targeted investment programmes are less likely to generate experiences of social stigmatization, such as those associated with alternative responses to group inequalities like affirmative action programmes or transfers directly targeted at disadvantaged groups (see for example, Stewart et al. 2007).

More importantly, the findings here also point to a need to consider more carefully the role of education in poverty reduction strategies devised for Madagascar. In particular the fact that spatial distribution of educational attainments does not always perfectly correspond with variations in income poverty in the island, suggests that additional school provision will not always be the most effective mechanism to overcome poverty in rural areas. In the southern highlands, for example, where a high incidence of income poverty coincides with historically better provision of formal education, more investments in the supply of education are likely to have a lower marginal impact on poverty rates than investments in alternative sectors such as rural transport or farming. In the

Malagasy context, targeting priorities between the education sector and more conventional poverty alleviation strategies do not always overlap, and, in some cases, the educational inequalities identified here may need to be considered independently of their wider relevance for poverty alleviation policies.

The remaining chapters in this thesis have explored wider possibilities of incorporating the proposed group-sensitive perspective into the literature on programme targeting and opportunity measurement. Chapter 3 outlined a proposal for the targeting of poverty alleviation efforts in contexts of imperfect data availability and low technical capacity. Drawing on a growing literature on so called 'asset' and 'basic needs' measures, I have presented an index that combines information on household dwelling characteristics, asset ownership, as well as household access to basic utilities such as water, sanitation and electricity. I have shown that, provided appropriate aggregation procedures are used, this index may be easily decomposed into its constituent components. This then allows to make simple, two-dimensional comparisons of household wellbeing in the domain of private wealth and service access.

The evaluative framework offered by this index also provides a new perspective to analyze differences in wellbeing at more aggregate spatial levels. In a low income country like Madagascar, where there are strong gaps in the coverage of even basic public services, local differences in public goods provision often constitute, in themselves, an important factor behind spatial variations in living standards.[213] These variations can be relatively easily incorporated into the evaluation of spatial inequalities, assuming that information on local service provision is available. In Chapter 3, I explored this possibility through a case study that classified communities by their level of service access, using administrative data on the same utilities included in the asset index to describe variations in service access at the household level.

---

[213] This is based on the assumption that public goods have community wide externalities, independent of household specific variations in service access, see Chapter 3.

The case study that uses this classification indicates that, at the aggregate level, there are considerable overlaps between the dimensions of private wealth and public service supply. At the national level, communities with a wider range of local services are also consistently ranked above municipalities with fewer public services, in terms of their inhabitants' asset ownership.[214] However, at lower levels of geographic aggregation the direct comparison of private household wealth and local public goods provision reveals some reversals in the wellbeing ranking of areas that would be omitted under more conventional income or wealth based measures. Especially in the less developed south of the country, some regions that are ranked as relatively poor in terms of their population's private asset wealth actually have higher levels of public service supply than some comparatively wealthier areas in the economically more advanced north. This finding illustrates the need for more disaggregated comparisons of social and spatial inequalities. Moreover, it points again to possible tensions between competing indictors of wellbeing, prompting a reconsideration of more established views about geographic targeting priorities of poverty alleviation programmes in Madagascar.

Chapter 4 explored the potential contribution of a more group-sensitive perspective in the context of an empirical operationalization of Amartya Sen's capability approach. Previous empirical applications of the capability approach were often hampered by the fact that a core aspect of a person's capability– the idea of capability freedom- is by nature unobservable. In the typical case the analyst will be able to observe only the wellbeing outcomes that were actually achieved (chosen). Yet, it will not be possible to make statements about the range of alternative outcomes that were in principle available to the agent, but were, for various reasons, not chosen. This limits the ability to make statements about the level of actual wellbeing opportunity enjoyed by the person and imposes serious

---

[214] The spatial comparison of the asset index exclude information on households' service access, in order to circumvent problems caused by correlation between local public goods production and private service access.

limitations on the analytical practicability of the capability approach (Comim 2008, Sudgen 1993).

Chapter 4 argued that the group-based approach proposed here may again offer a solution for the operationalization of the capability approach. In many settings, the extent of capability freedom experienced by different agents will vary considerably along social or spatial divides. These differences will be reflected in systematic variations in achievements between the relevant groups and areas. Information on group inequalities may thus offer an approximate indication of systematic variations in individual wellbeing opportunities across group lines, which can then be used for the analysis of a person's level of capability freedom. Drawing on recent literature on the measurement of opportunity inequality (Roemer 1998), I formalized this idea in an index that infers an individual's set of basic capabilities from the average achievements of persons who have the same group attributes and live in the same area.

Applied again to a case study across religious groups and urban – rural areas in Madagascar, this index reveals important differences in wellbeing opportunities across religious lines reaching well beyond the educational inequalities reported in Chapter 2 of this thesis. Using three recent rounds of Demographic and Health Surveys, a measure of capability inequality was constructed that traced feasible outcomes in a number of dimensions, including literacy, utility access, child health, transport or media access. Even though this measure documents gradual improvements in most of these dimensions across all population groups, traditional believers and populations living in rural areas continue to fare consistently worse on most indicators over the full time period considered. This lack of convergence in achievements points to considerable and persistent inequalities in underlying wellbeing opportunities along religious and urban-rural lines. It appears that the historical inequalities between Christians and traditional believers documented in Chapter 2 continue to be reproduced by economic and social conditions in Madagascar today. The analysis along the lines

of capabilities thus reinforces the case for more inclusive and redistributive policies that would be required to break these cycles of uneven development.

Even though the proposed group-sensitive approach has helped to uncover important differences in wellbeing opportunity in the context of my case studies in Madagascar, the approach is not free of its own problems. Group categories such as religion, race or ethnicity are notoriously hard to define and in many cases individuals may be classified into multiple groups at the same time. Moreover, concerns about data quality are often substantive in the context of developing countries, and the available information may not always allow the attribution of interpersonal inequalities to group level or spatial influences at great levels of detail. For instance, household surveys, which may in principle be designed to closely study interactions between individuals (or households) and their physical and social environments, will often be limited with respect to their sample sizes. Depending on how sample frames are set up, this will either make it harder to capture social and spatial interactions at very low levels of aggregation, or it will restrict the possibility of representative statements across larger areas or population groups.

The chapters in this thesis do not manage to fully overcome these problems, and most of the findings on social and spatial inequalities presented here still come with some level of uncertainty. However, the experiences of this research project suggest that even in a context of imperfect data availability (like Madagascar) there are usually ways to mitigate concerns both about the reliability of group-based inequality measures and to present information on social and spatial inequalities at meaningful levels of social and spatial aggregation. For instance, the claims about the importance of religious inequalities made in Chapter 2 of this thesis receive added support by the fact that differences between traditional believers and Christians are relatively consistent across multiple data sets, including several micro level studies, a national household survey and three rounds of Demographic and Health Surveys. This sort of triangulation, and validity tests on alternative sources of data, is in principle feasible in many other

research settings and may help to deal with concerns about the reliability of group-based inequality estimates.

Moreover, this thesis suggests that even when the informational base for group comparisons appears to be weak, there are often under-used sources of data that can be employed to enhance the analysis of social and spatial inequalities. For example, archival and administrative data that have been used here to trace interreligious and spatial variations of wellbeing within rural areas and larger geographic regions of Madagascar, are in principle available in most other low income countries. Provided this information can be linked to more detailed household surveys, these alternative data sources may represent an important means for enhancing the relevance and 'salience' of social and spatial comparisons in contexts similar to Madagascar.[215] Likewise, population censuses, which have much larger local sample sizes than standard household surveys, often contain information on ethnicity, religion, or other social group categories, along with indicators on relevant household attributes, such as education, housing, or access to basic utilities like water or sanitation. Again, this information may be used to study inequalities and interactions within groups and locations in more detail at much lower levels of aggregation than would be possible on the basis of more conventional survey data (see, for example, Stewart et al. 2009: 14, Brown / Stewart 2006).[216]

---

[215] However, to link these data to household specific outcomes it is usually necessary that household surveys permit identification of the site of data collection. This is for example not the case with Demographic and Health Surveys. But it is a common feature of standard expenditure and living standard measurement surveys in many low income countries.

[216] In the past, census data in Sub Saharan Africa have not typically been used for the analysis of social inequalities. Demographers, who often draw on census data to study links between wellbeing, fertility change or educational outcomes mostly limit their analysis to processes at the household level, but they generally do not look at more aggregate inequalities at the group or spatial level (see for example van de Walle 2005). More recent efforts, such as the World Bank's poverty mapping initiative rectify this omission somewhat, by using census data to construct geographically disaggregated poverty estimates (see, for example, Bedi et al. 2007). However, the extrapolation of consumption aggregates from household attributes poses its own technical problems (Banerjee et al. 2006). Moreover, poverty maps do not typically explore inequalities between groups (for a recent exception see Agostini et al. 2010). In practice it would be more interesting to use census data to study directly differences in asset wealth and other endowments across relevant group and spatial lines. In this study this was not done as the latest available population census for Madagascar dates back to 1993.

Another potential drawback of the group-based approach proposed here is its inherent context specificity. Group-related determinants of wellbeing opportunities, such as the historical origins of interreligious inequalities in education identified here in Madagascar, are evidently directly dependent on their local context. This potentially limits the possibility to generalize findings beyond a particular research setting and may make it difficult to formulate more general theories about group-specific determinants of wellbeing inequality.[217] Moreover, measures of wellbeing that are based on group level information, such as the index of capability freedom presented in Chapter 4, or the growing number of measures of opportunity equality that it builds on, tend to be very sensitive to changes in the underlying definition of group partitionings (in addition to violating a range of axioms commonly required of conventional poverty and inequality measures). The validity of estimates of opportunity equality produced by these measures is thus often limited to the particular research context, and it may be difficult to compare results across countries or settings where alternative group partitionings may be relatively more important.

However, the context dependency of the group-based approach is not such a large drawback if one considers more general shortcomings often associated with cross country level studies on social inequalities and intergroup relations. For example, much of the empirical literature that now exists on ethnic or religious inequality, fractionalization, or polarization only assesses the effects of group differences on development outcomes and conflict on the basis of cross country regressions (Easterly / Levine 1997, Alesina et al. 2003, Collier / Hoeffler 1998, Montalvo / Reynal Querol 2003, 2005). This literature however, faces the full range of problems usually associated with cross country studies, including questions about the reliability and comparability of underlying group definitions, concerns about data quality, or the difficulty of dealing with

---

[217] Although some generalizations are clearly possible. For example, the more fundamental relationship between group segregation, uneven levels of public goods provision and inequalities in wellbeing documented in the case study in Chapter 2 is likely to hold in other cases as well (see below, as well as Van de Walle / Gunewardena 2001, Baulch et al. 2002, Kabeer 2006).

unobserved country effects.[218]   When seen in this light, the inherent context-dependency of the group-sensitive approach proposed here may actually turn out to be a useful attribute, and important evidence may arise from more country specific analysis of group and spatial differences.

All of these arguments thus reinforce the initial conviction of this thesis: that there is considerable scope for more group-sensitive analysis of social inequalities in many parts of the developing world. Based on the empirical and methodological findings of the preceding chapters, such a research programme may be organized around at least three questions.

First, it appears that, similar to the approach taken in Chapter 2 of this thesis, there is some potential for more explorative analysis of under-examined dimensions of group inequalities in low income countries. For example, in spite of the lack of systematic research on religious inequalities in sub-Saharan Africa, it is not unrealistic to assume that inequalities between traditional believers and religious majorities similar to those observed in Madagascar will exist in other parts of the continent, where differences between religious groups have not yet been analyzed in great detail (this obviously excludes countries where religious divides have strong political salience, such as Nigeria or Sudan). As was the case in this thesis, in these settings more careful analysis along alternative group partitionings may uncover new priorities for the targeting of poverty alleviation efforts. And it may point to variations in outcomes across dimensions, groups and regions that were overlooked by previous research.[219]

Second, studies of social and spatial inequalities should move beyond simple assessments of group differences in economic or social outcomes to

---

[218] These problems may also explain why this literature has failed to produce conclusive evidence on important questions, such as the relative importance of ethnic over religious divides, or whether it is group fractionalization or polarization that increases the likelihood of violent conflict.

[219] This type of analysis receives added importance by the increasing presence of evangelical and Pentecost missionaries in many sub-Saharan countries. It should be expected that the growth of these churches alters substantially social interactions and group identities at the local level.

capture relevant aspects of the organization of the groups that are being analyzed. For example, measures of ethnic and religious polarization that are now widely used in the cross country analysis of conflict (see above) can be equally fruitfully employed to assess the strength of group identities and possible feelings of alienation across groups within countries.[220] In addition, the findings of this thesis suggest that it would be useful to study in more detail patterns in the social and spatial organization of groups that could explain variations both in the strength of group level interactions and the distribution of social opportunities within and across groups. For instance, a high degree of spatial proximity between members of the same group may in itself help to explain why certain groups are more likely to mobilize around common interests (including possibilities of engaging in 'constructive' collective action or group conflict). Likewise, as was the case in my analysis of the outcomes of traditional believers in Madagascar, the concentration of certain groups in more disadvantaged areas may be an important part of the explanation for the persistence of group differences, in addition to more widely debated causes of group inequalities, such as political or cultural discrimination.

Finally, and directly extending some of the conceptual work presented in this thesis, there appears to be much scope to move beyond the simple documentation of group-related inequalities in opportunities, to study how these differences in advantage affect other social, economic and political outcomes of interest to analysts and policy makers. For instance, while inequality, when measured conventionally in terms of incomes, has rarely been a reliable predictor of conflict or other economic and social outcomes, the link between a country's developmental performance and the local extent of opportunity inequality is still under-explored. This implies that the conceptual proposals for the measurement of inequalities in wellbeing opportunities explored here and elsewhere may offer valuable contributions to the wider debate on social and economic development,

---

[220] Of course initial proposals for polarization measures were often motivated by concerns about class or group-based alleniation in modern societies. See for example Esteban / Ray 1994, 2008 as well Jayadev / Reddy 2009 for a related proposal that assess polarization outside the domain of incomes.

and that important new empirical lessons may emerge, when these concepts are used to predict variations in local development performance.[221]

My own work discussed in this thesis only represent one first and preliminary step in the direction of such a research agenda. However, I hope to expand on these questions in the context of future case studies and conceptual investigations of the origins of social and spatial inequalities in the global South.

---

[221] Again, the country specific approach proposed here may offer a useful framework for this type of research, as it would allow to take into account country specific contexts and histories that are likely to influence the relationship between opportunity equality and other political and social outcomes.

6 Bibliography

Acemoglu, Daron, Johnson, Simon, and Robinson, James A. (2001), 'The Colonial Origins of Comparative Development: An Empirical Investigation', *American Economic Review*, 91 (5), 1369-401.

African Development Bank (2002), *Achieving the Millennium Development Goals in Africa: Progress, Prospects, and Policy Implications* (Tunis).

Agostini, Claudio A., Brown, Philip H., and Roman, Andrei C. (2010), 'Poverty and Inequality Among Ethnic Groups in Chile', *World Development*, 38 (7), 1036-46.

Akerlof, George A (1978), 'The Economics of "Tagging" as Applied to the Optimal Income Tax, Welfare Programs, and Manpower Planning', *American Economic Review*, 68 (1), 8-19.

Akerlof, George A and Kranton, Rachel E. (2000), 'Economics and Identity', *The Quarterly Journal of Economics*, 15 (3), 715-53.

Alderman, Harold, Hentschel, Jesko, and Sabates, Ricardo (2003), 'With the Help of one's Neighbors: Externalities in the Production of Nutrition in Peru', *Social Science & Medicine*, 56, 2019-31.

Alesina, Alberto, et al. (2003), 'Fractionalization', *Journal of Economic Growth*, 8 (2), 155-94.

Alesina, Alberto and La Ferrara, Eliana (2005), 'Ethnic Diversity and Economic Performance', *Journal of Economic Literature*, 43 (3), 762-800.

Alkire, Sabina (2007), 'Choosing Dimensions: The Capability Approach and Multidimensional Capability', in Nanak Kakwani and Jacques Silber (eds.), *The Many Dimensions of Poverty* (New York: Palgrave Macmillan), 89-119.

--- (2008), 'Using the Capabilities Approach: Prospective and Evaluative Analyses', in Flavio Comim, Mozaffar Qizilbash, and Sabina Alkire (eds.), *The Capability Approach: Concepts, Measures and Applications* (Cambridge: Cambridge University Press), 1-49.

Alkire, Sabina and Foster, James (2008), 'Counting and Multidimensional Poverty Measurement', (Oxford: OPHI Working Paper No. 7.).

Allen, Philip M. (1995), *Madagascar. Conflicts of Authority in the Great Island* (Boulder Col.: Westview Press).

Altonji, Joseph G., Elder, Todd E., and Taber, Christopher (2005), 'Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools', *Journal of Political Economy*, 113 (1), 151-84.

Anand, Paul, Hunter, Graham, and Smith, Ron (2005), 'Capabilities and Well-Being: Evidence Based on the Sen–Nussbaum Approach to Welfare', *Social Indicators Research*, 74 (1), 9-55.

Anand, Paul and van Hees, Martin (2006), 'Capabilities and Achievements: An Empirical Study', *Journal of Socio-Economics*, 35 (2), 268-84.

Anand, Paul, et al. (2009), 'The Development of Capability Indicators', *Journal of Human Development and Capabilities*, 10 (1), 125-52.

Anderson, Elijah (1999), *Code of the Street: Decency, Violence, and the Moral Life of the Inner City* (New York: W.W. Norton).

Andrianjafy, Haja, et al. (2002), *Impact of the Political Crisis in Rural Areas: Results of a Rapid Rural Appraisal* (Ithaca N.Y.: Cornell University Ilo Program).

Appadurai, Arjun (1989), 'Small Scale Techniques and Large Scale Objectives', in Pranab Bardhan (ed.), *Conversations Between Economists and Anthropologists: Methodological Issues in Measuring Economic Change in Rural India* (New Delhi: Oxford University Press), 250-82.

Appleton, Simon (2000), *Education and Health at the Household Level in Sub-Saharan Africa* (Cambridge Mass.: Harvard University, Center for International Development Working Paper No. 33).

Appleton, Simon and Booth, David (2001), *Combining Participatory and Survey-based Approaches to Poverty Monitoring and Analysis* (Background paper for a workshop on poverty reduction, Entebbe, Uganda, 30 May – 1 June 2001).

Arestoff, Florence and Bommier, Antoine (1999), *Efficacité Rélative des Ecoles Publiques et Privées à Madagascar. Mimeo* (Paris: DIAL Working Paper 99/04).

Arneson, Richard J. (1989), 'Equality and Equal Opportunity for Welfare', *Philosophical Studies, 56* (1), 77-93.

Arrow, Kenneth, Bowles, Samuel, and Durlauf, Stephen (eds.) (2000), *Meritocracy and Economic Inequality* (Princeton: Princeton University Press).

Atkinson, Anthony B. (1970), 'On the Measurement of Inequality', *Journal of Economic Theory, 2,* 244-63.

--- (1987), 'On the Measurement of Poverty', *Econometrica, 55,* 749-64.

--- (2003), 'Multidimensional Deprivation: Contrasting Social Welfare and Counting Approaches', *Journal of Economic Inequality, 1* (1), 51-65.

Bamberger, Michael (ed.), (2000), *Integrating Quantitative and Qualitative Research in Development Projects* (Washington D.C.: The World Bank).

Banerjee, Abhijit and Duflo, Esther (2003), 'Inequality and Growth: What Can the Data Say?' *Journal of Economic Growth, 8* (3), 267-99.

Banerjee, Abhijit, et al. (2006), *An Evaluation of World Bank Research, 1998 - 2005* (Washington D.C.: The World Bank).

Bardhan, Pranab K. (ed.) (1989), *Conversations Between Economists and Anthropologists: Methodological Issues in Measuring Economic Change in Rural India* (New Dehli: Oxford University Press).

Bardhan, Pranab and Mookherjee, Dilip (2006), 'Pro-poor Targeting and Accountability of Local Governments in West Bengal', *Journal of Development Economics 79,* 303– 27.

--- (2010), 'Determinants of Redistributive Politics: An Empirical Analysis of Land Reforms in West Bengal, India', *American Economic Review, 100* (4), 1572–600.

Barrett, Christopher B. (ed.), (2005), *The Social Economics of Poverty* (New York: Routledge).

Barrett, Christopher B. (2005), 'On the Relevance of Identities, Communities, Groups, and Networks to the Economics of Poverty Alleviation', in Christopher B. Barrett (ed.), *The Social Economics of Poverty* (New York: Routledge), 1-11.

Barrett, Christopher B., et al. (2006), 'Welfare Dynamics in Rural Kenya and Madagascar', *Journal of Development Studies*, 42 (2), 248 - 77.

Baulch, Bob and Hoddinott, John (2000), 'Economic Mobility and Poverty Dynamics in Developing Countries', *Journal of Development Studies*, 36 (6), 1-24.

Baulch, Bob, et al. (2002), *Ethnic Minority Development in Vietnam: A Socioeconomic Perspective* (Washington D.C.: World Bank, Policy Research Working Paper no. 2836).

Bavetta, Sebastiano and Guala, Francesco (2003), 'Autonomy, Freedom and Deliberation', *Journal of Theoretical Politics*, 15 (4), 423-43.

Bayer, Patrick, Fang, Hanming, and McMillan, Robert (2005), *Separate When Equal? Racial Inequality and Residential Segregation* (Cambridge Mass.: National Bureau of Economic Research (NBER) working paper no. 11507).

Becker, Gary B. (1967), *Human Capital and the Personal Distribution of Income* (Ann Arbor, Mich.: University of Michigan Press).

Becker, Gary B. and Chiswick, Barry, R. (1966), 'Education and the Distribution of Earnings', *American Economic Review*, 56 (1/2), 358-69.

Becker, Sascha O. and Woessmann, Ludger (2008), 'Luther and the Girls: Religious Denomination and the Female Education Gap in Nineteenth-century Prussia. ' *Scandinavian Journal of Economics*, 110 (4), 777-805.

--- (2009), 'Was Weber Wrong? A Human Capital Theory of Protestant Economic History', *Quarterly Journal of Economics*, 124 (2), 531-96.

Bedi, Tara, Coudouel, Aline, and Simler, Kenneth (2007), 'Poverty Maps for Policy Making. Beyond the Obvious Targeting Applications', in Tara Bedi, Aline Coudouel, and Kenneth Simler (eds.), *More than a Pretty Picture: Using Poverty Maps to Design Better Policies and Interventions* (Washington D.C.: The World Bank).

Bertrand, Marianne, Luttmer, Erzo F.P., and Mullainathan, Sendhil (2000), 'Network Effects and Welfare Cultures', *Quarterly Journal of Economics*, 115 (3), 1019-55.

Besley, Timothy, et al. (2004), 'The Politics of Public Good Provision: Evidence from Indian Local Governments', *Journal of the European Economic Association*, 2 (2-3), 416-26.

Blinder, Alan S. (1973), 'Wage Discrimination: Reduced Form and Structural Estimates', *Journal of Human Resources*, 8 (4), 436–55.

Bloch, Maurice (1971), *Placing the Dead: Tombs, Ancestral Villages and Kinship Organization in Madagascar* (Seminar studies in anthropology 1; London: Seminar Press).

--- (2002), 'Are Religious Beliefs Counter-intuitive? ' in Nancy Franckenberry (ed.), *Radical Interpretation in Religion* (Cambridge: Cambridge University Press), 129-46.

Bobonis, Gustavo, J. and Finan, Frederico (2007), *Endogenous Peer Effects in School Participation* (mimeo).

Bolt, Jutta and Bezemer, Dirk (2009), 'Understanding Long-run African Growth: Colonial Institutions or Colonial Education?' *Journal of Development Studies,* 45 (1), 24-54.

Bommier, Antoine and Lambert, Sylvie (2000), 'Education Demand and Age at School Enrolment in Tanzania', *Journal of Human Resources,* 35 (1), 177-203.

Booth, David, et al. (1998), *Participation and Combined Methods in African Poverty Assessment: Renewing the Agenda* (London: Report commissioned by the UK Department For International Development for the Working Group on Poverty and Social Policy, Special Program of Assistance for Africa).

Booysen, Frikkie, et al. (2008), 'Using an Asset Index to Assess Trends in Poverty in Seven Sub-Saharan African Countries', *World Development,* 36 (6), 1113-30.

Borjas, George J. (1995), 'Ethnicity, Neighbourhoods, and Human-Capital Externalities', *American Economic Review,* 85 (3), 365-90.

Botticini, Maristella and Eckstein, Zvi (2005), 'Jewish Occupational Selection: Education, Restrictions, or Minorities?' *Journal of Economic History,* 65 (4), 922-48.

Bourguignon, Francois (2006), 'From Income to Endowments: The Difficult Task of Expanding the Income Poverty Paradigm', in David B. Grusky and Ravi Kanbur (eds.), *Poverty and Inequality* (Stanford CA: Stanford University Press), 76-102.

Bourguignon, Francois and Chakravarty, Satya R. (2003), 'The Measurement of Multidimensional Poverty', *Journal of Economic Inequality,* 1, 25-49.

Bourguignon, Francois, Ferreira, Francisco H.G., and Menendez, Marta (2007), 'Inequality of Opportunity in Brazil', *Review of Income and Wealth,* 53 (4), 585-618.

Bourguignon, Francois, Ferreira, Francisco H. G., and Walton, Michael (2007a), 'Equity, Efficiency and Inequality Traps: A Research Agenda', *Journal of Economic Inequality,* 5, 235-56.

Bowles, Samuel and Gintis, Herbert (1998), 'Efficient Redistribution: New Rules for Markets, States and Communities', in Samuel Bowles, Herbert Gintis, and Erik Olin Wright (eds.), *Recasting Egalitarianism: New Rules for Communities, States and Markets* (London: Verso), 3-71.

Bowles, Samuel, Gintis, Herbert, and Wright, Erik Olin (eds.) (1998), *Recasting Egalitarianism: New Rules for Communities, States and Markets* (London: Verso).

Bowles, Samuel, Gintis, Herbert, and Groves, Melissa O. (eds.) (2005), *Unequal Chances: Family Background and Economic Success* (Princeton: Princeton University Press).

Bowles, Samuel, Gintis, Herbert, and Groves, Melissa O. (2005), 'Introduction', in Samuel Bowles, Herbert Gintis, and Melissa O. Groves (eds.), *Unequal Chances: Family Background and Economic Success* (Princeton: Princeton University Press), 1-22.

Breen, Richard and Goldthorpe, John H. (1997), 'Explaining Educational
    Differentials: Towards a Formal Rational Action Theory', *Rationality and
    Society, 9* (3), 275-305.
Brown, Graham and Stewart, Frances (2006), *The Implications of Horizontal
    Inequality for Aid* (Oxford Centre for Research on Inequality, Human
    Security and Ethnicity Working Paper no. 36).
Burchardt, Tania (2009), 'Agency Goals, Adaptation and Capability Sets', *Journal
    of Human Development and Capabilities, 10* (1), 3-19.
Burger, Rulof, Burger, Ronelle, and van der Berg, Servaas (2004), *Emergent
    Black Affluence and Social Mobility in Post-Apartheid South Africa*
    (University of Stellenbosch Development Policy Research Unit Working
    Paper 04/87).
Campbell, John and Holland, Jeremy (2005), *Methods in Development Research:
    Combining Qualitative and Quantitative Approaches* (Rugby, UK: ITDG
    Publishing).
Canagarajah, Sudharshan and Coulombe, Harold (1997), *Child Labor and
    Schooling in Ghana* (Washington DC: World Bank Policy Research
    Working Paper No. 1844).
Carter, Michael R. and May, Julian (1999), 'Poverty, Livelihood and Class in
    Rural South Africa', *World Development, 27* (1), 1-20.
Carter, Michael R. and Barrett, Christopher B. (2006), 'The Economics of
    Poverty Traps and Persistent Poverty: An Asset-Based Approach', *Journal
    of Development Studies, 42* (2), 178-99.
Carvalho, Sonyia and White, Howard (1997), *Combining the Quantitative and
    the Qualitative Approaches to Poverty Measurement and Analysis*
    (Washington D.C.: World Bank Technical Paper no. 366).
Case, Anne C. and Katz, Lawrence F. (1991), *The Company you Keep: The
    Effects of Family and Neighborhood on Disadvantaged Youths*
    (Cambridge Mass.: National Bureau of Economic Research (NBER)
    working paper no. 3705).
Chambers, Robert (1997), *Whose Reality Counts? Putting the First Last* (London:
    Intermediate Technology).
--- (2003), 'Qualitative Approaches: Self Criticism and What Can Be Gained
    from Quantitative Approaches', in Ravi Kanbur (ed.), *Q-Squared:
    Qualitative and Quantitative Methods of Poverty Appraisal* (New Delhi:
    Permanent Black), 28-34.
Checchi, Daniele and Peragine, Vitorocco (2005), *Regional Disparities and
    Inequality of Opportunity: The Case of Italy* (Bonn: IZA Discussion Paper
    1874).
Chiswick, Barry, R. (1986), 'Labor Supply and Investment in Child Quality: A
    Study of Jewish and Non-Jewish Women', *The Review of Economics and
    Statistics, 68* (4), 700-03.
--- (1988), 'Differences in Education and Earnings Across Racial and Ethnic
    Groups. Tastes, Discrimination and Investments in Child Quality',
    Quarterly Journal of Economics 103 (3), 571-97.
Christiaensen, Luc, Demery, Lionel, and Paternostro, Stefano (2005), 'Reforms,
    Remoteness and Risk in Africa: Understanding Inequality and Poverty

During the 1990s', in Ravi Kanbur and Anthony J. Venables (eds.), *Spatial Inequality and Development* (Oxford: Oxford University Press), 209-34.

Coleman, James S. (1988), 'Social Capital in the Creation of Human Capital', *American Journal of Sociology,* 94 (supplement), 95-120.

Coleman, James S., Hoffer, Thomas, and Kilgor, Sally (1987), *High School Achievement: Public, Catholic and Private Schools Compared* (New York: Basic Books).

Collier, Paul and Hoeffler, Anke (1998), 'On Economic Causes of Civil War', *Oxford Economic Papers,* 50, 563-73.

Collier, Paul and Gunning, Jan Willlem (1999), 'Explaining African Economic Performance', *Journal of Economic Literature,* 37 (1), 64-111.

Collier, Paul, et al. (2003), *Breaking the Conflict Trap: Civil War and Development Policy* (Washington D.C.: The World Bank).

Comim, Flavio (2008), 'Measuring Capabilities', in Flavio Comim, Mozaffar Qizilbash, and Sabina Alkire (eds.), *The Capability Approach: Concepts, Measures and Applications* (Cambridge: Cambridge University Press), 157-200.

Conning, Jonnathan H. and Kevane, Michael (2002), 'Community-Based Targeting Mechanisms for Social Safety Nets: A Critical Review', *World Development,* 30 (3), 375-94.

Cutler, David M. and Glaeser, Edward L. (1997), 'Are Ghettos Good or Bad?' *The Quarterly Journal of Economics,* 112 (3), 827-72.

Dasgupta, Indraneel and Kanbur, Ravi (2005), 'Community and Anti-Poverty Targeting', *Journal of Economic Inequality,* 3 (3), 281-302.

de Barros, Ricardo Paes , et al. (2009), 'Measuring Inequality of Opportunities in Latin America and the Caribbean', (Washington D.C.: The World Bank).

de Haan, Arjan and Dubey, Amaresh (2004), *Conceptualising Social Exclusion in the Context of India's Poorest Regions: A Contribution to the Quantitative-Qualitative Debate* (paper presented at the Conference on Q-squared in Practice: Experiences of Combining Qualitative and Quantitative Methods in Poverty Appraisal, Toronto).

de Herdt, Tom and Deneulin, Severinne (2007), 'Individual Freedoms as Relational Experiences. Guest Editor's Introduction', *Journal of Human Development and Capabilities,* 8 (2), 179-84.

Deaton, Angus (1997), *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy* (Washington D.C./Baltimore: The World Bank / Johns Hopkins University Press).

Decancq, Koen and Lugo, Maria Ana (2008), *Weights in Multidimensional Indices of Well-Being: An Overview* (mimeo).

Deneulin, Severinne (2008), 'Beyond Individual Freedom and Agency: Structures of Living Together in the Capabilities Approach', in Flavio Comim, Mozaffar Qizilbash, and Sabina Alkire (eds.), *The Capability Approach: Concepts, Measures and Applications* (Cambridge: Cambridge University Press), 105-24.

Desai, Meghnad (1995), *Poverty, Famine and Economic Development. The Selected Essays of Meghnad Desai, Vol II* (Aldershot: Edward Elgar).

Deschamps, Hubert (1959), *Les Migrations Intérieures Passées et Présentes à Madagascar* (Paris).

--- (1960), *Histoire de Madagascar* (Paris: Berger-Levrault).

Desmet, Klaus, Ortuño-Ortín, Ignacio, and Weber, Shlomo (2009), 'Linguistic Diversity and Redistribution', *Journal of the European Economic Association,* 7 (6), 1291–318.

Dietz, Robert D. (2002), 'The Estimation of Neighbourhood Effects in the Social Sciences: An Interdisciplinary Approach', *Social Science Research,* 31, 539-75.

Dissou, Yazid, et al. (2000), *Pauvreté à Madagascar: Défi Public et Stratégies des Ménages* (mimeo).

Dreze, Jean and Sen, Amartya K. (2002), *India, Development and Participation* (New Delhi: Oxford University Press).

Duclos, Jean-Yves, Sahn, David E., and Younger, Stephen D. (2006), 'Robust Multidimensional Spatial Poverty Comparisons in Ghana, Madagascar, and Uganda', *The World Bank Economic Review,* 20 (1), 91-113.

--- (2006a), 'Robust Multidimensional Poverty Comparisons', *The Economic Journal,* 116, 943-68.

Duflo, Esther (2005), 'Why Political Reservations?' *Journal of the European Economic Association,* 3 (2-3), 668-78.

Duncan, Otis Dudley and Duncan, Beverly (1955), 'A Methodological Analysis of Segregation Indexes', *American Sociological Review,* 20 (2), 210-17.

Durkin, M.S., et al. (1994), 'Measures of Socioeconomic Status for Health Research: Comparative Results From Bangladesh and Pakistan', *Social Science & Medicine,* 38 (9), 1289-97.

Durlauf, Steven N. (2002), *Groups, Social Influences and Inequality: A Membership Theory Perspective on Poverty Traps* (mimeo).

--- (2003), *Neighbourhood Effects* (mimeo).

Durlauf, Steven N. and Young, Peyton H. (eds.) (2001), *Social Dynamics* (Cambridge, Mass.: MIT Press).

Dworkin, Ronald (1981), 'What is Equality? Part 1: Equality of Welfare', *Philosophy and Public Affairs,* 10, 185-246.

--- (1981a), 'What is Equality? Part 2: Equality of Resource', *Philosophy and Public Affairs,* (10), 283-345.

--- (2000), *Sovereign Virtue: The Theory and Practice of Equality* (Cambridge Mass.: Harvard University Press).

Easterly, William and Levine, Ross (1997), 'Africa's Growth Tragedy: Policies and Ethnic Divisions', *Quarterly Journal of Economics,* 112 (4), 1203-50.

Elbers, Chris, et al. (2008), 'Reinterpreting Between-Group Inequality', *Journal of Economic Inequality,* 6 (3), 231-45.

Elder, Todd E., Goddeeris, John H., and Haider, Steven J. (2009), 'Unexplained Gaps and Oaxaca-Blinder Decompositions', *Labour Economics,* 17 (1), 284-90.

Ellis, Stephen (2009), 'Madagascar: Roots of Turmoil', *Open Democracy* 23 March (http://www.opendemocracy.net/article/madagascar-roots-of-turmoil, last accessed 05.09.2010).

283

Elster, Jon (1983), *Sour grapes: Studies in the Subversion of Rationality* (New York: Cambridge University Press).

Escobal, Javier and Torero, Maximo (2005), 'Adverse Geography and Differences in Welfare in Peru', in Ravi Kanbur and Anthony J. Venables (eds.), *Spatial Inequality and Development* (Oxford: Oxford University Press), 77-122.

Esteban, Joan and Ray, Debraj (1994), 'On the Measurement of Polarization', *Econometrica*, 62 (4), 819–52.

--- (2008), 'Polarization, Fractionalization and Conflict', *Journal of Peace Research*, 45 (2), 163-82.

Evans, William and Schwab, Robert (1995), 'Finishing High School and Starting College: Do Catholic Schools Make a Difference?' *Quarterly Journal of Economics*, 110 (4), 941-74.

Evers, Sandra (2002), *Constructing History, Culture and Inequality: The Betsileo in the Extreme Southern Highlands of Madagascar* (Cologne: Brill).

Fafchamps, Marcel and Moser, Christine (2003), 'Crime, Isolation and Law Enforcement', *Journal of African Economies*, 12 (4), 625-71.

Fafchamps, Marcel and Minten, Bart (2007), 'Public Service Provision, User Fees and Political Turmoil', *Journal of African Economies* 16 (3), 485-518.

Farley, Reynolds, et al. (1994), 'Stereotypes and Segregation: Neighborhoods in the Detroit Area', *The American Journal of Sociology*, 100 (3), 750-80.

Ferreira , Francisco H. G. and Gignoux, Jeremie (2008), *The Measurement of Inequality of Opportunity: Theory and an Application to Latin America* (Washington D.C.: World Bank Policy Research Working Paper no. 4659).

Ferreira , Sergio G. and Veloso, Fernando A. (2003), 'Intergenerational Mobility of Wages in Brazil', *Brazilian Review of Econometrics*, 26 (2), 181-211.

Fields, Gary S. (2006), 'The Many Facets of Economic Mobility', (Ithaca: Cornell University. Articles and Chapters paper no. 230).

Figueroa, Adolfo and Barron, Manuel (2005), *Inequality, Ethnicity and Social Disorder in Peru* (Oxford Centre for Research on Inequality, Human Security and Ethnicity Working Paper no. 8).

Filmer, Deon and Pritchett, Lant (1998), 'Estimating Wealth Effects without Expenditure Data -or Tears: With an Application to Educational Enrolments in States of India, Volume 1. World Bank Policy Research Working Paper', (Washington D.C.: The World Bank).

Foster, James, Greer, Joel, and Thorbecke, Erik (1984), 'A Class of Decomposable Poverty Measures', *Econometrica*, 52 (3), 761-66.

Foster, James, E. and Shorrocks, Anthony (1988), 'Poverty Orderings and Welfare Dominance', *Social Choice and Welfare*, 5, 179-98.

Freeman, Luke E. (2001), 'Knowledge, Education and Social Differentiation Amongst the Betsileo of Fisakana, Highland Madagascar', (Doctoral Thesis submitted to the Department of Anthropology, London School of Economics and Political Science).

Galasso, Emanuela and Ravallion, Martin (2005), 'Decentralized Targeting of an Antipoverty Program', *Journal of Public Economics*, 89 (4), 705-27.

Galbraith, James K. and Berner, Maureen (eds.) (2001), *Inequality and Industrial Change: A Global View* (New York: Cambridge University Press).

Gaskin, Darrell (2006), *Does Residential Segregation and Economic Inequality Explain Race Disparities in Health Services Use?* (Paper presented at the Annual Meeting of the Economics of Population Health, Madison, WI, June 4.).

Glaeser, Edward L., et al. (2004), 'Do Institutions Cause Growth?' *Journal of Economic Growth,* 9 (3), 271-303.

Glewwe, Paul and Jacoby, Hanan (1995), 'Student Achievement and Schooling Choice in Low-Income Countries: Evidence from Ghana', *Journal of Human Resources,* 29 (3), 843-64.

Glick, Peter and Sahn, David E. (2006), 'The Demand for Primary Schooling in Madagascar: Price, Quality, and the Choice Between Public and Private Providers', *Journal of Development Economics,* 79 (1), 118-45.

Gordon, David, et al. (2000), *Poverty and Social Exclusion in Britain* (York: Joseph Rowntree Foundation).

Gow, Bonar A. (1992), 'Review: "Bible et Pouvoir à Madagascar au XIXe Siècle. Invention d'une Identité Chrétienne et Construction de l'État" by Francoise Raison-Jourde', *The International Journal of African Historical Studies,* 25 (2), 450-52.

Granovetter, Mark S. (1973), 'The Strength of Weak Ties', *American Journal of Sociology,* 78 (6), 1360-80.

Grusky, David B. and Kanbur, Ravi (2006), 'Introduction: The Conceptual Foundations of Poverty and Inequality Measurement', in David B. Grusky and Ravi Kanbur (eds.), *Poverty and Inequality* (Stanford CA: Stanford University Press), 1-29.

Grusky, David B. and Weeden, Kim A. (2006), 'Does the Sociological Approach to Studying Social Mobility Have a Future?' in Stephen L. Morgan, David B. Grusky, and Gary S. Fields (eds.), *Mobility and Inequality. Frontiers of Research in Sociology and Economics* (Stanford Ca.: Stanford University Press), 85-108.

--- (2007), 'Measuring Poverty: The Case for a Sociological Approach', in Nanak Kakwani and Jacques Silber (eds.), *The Many Dimensions of Poverty* (New York: Palgrave Macmillan), 20-35.

Gurr, Ted R. (2000), *Peoples Versus States: Minorities at Risk in the New Century* (Washington D.C.: United States Institute of Peace Press).

Henry, Carla , et al. (2003), 'Assessing the Relative Poverty of Microfinance Clients: A CGAP Operational Tool, Overview', (Washington D.C.: The World Bank).

Hentschel, Jesko (1999), 'Contextuality and Data Collection Methods: A Framework and Application to Health Service Utilization', *Journal of Development Studies,* 35 (4), 64-94.

Hentschel, Jesko and Lanjouw, Peter F. (1998), *Household Welfare Measurement and the Pricing of Basic Services* (Washington D.C.: World Bank Policy Research Working Paper no. 2006).

Herring, Ronald J. and Agarwala, Rina (eds.) (2008), *Whatever Happened to Class? Reflections from South Asia* (London: Routledge).

Herrnstein, Richard J. and Murray, Charles (1994), *The Bell Curve: Intelligence and Class Structure in American Life* (New York: Free Press).

Hertz, Tom (2005), 'Rags, Riches and Race: The Intergenerational Economic Mobility of Black and White Families in the United States', in Samuel Bowles, Herbert Gintis, and Melissa O. Groves (eds.), *Unequal Chances: Family Background and Economic Success* (Princeton: Princeton University Press), 165-91.

--- (2006), *Understanding Mobility in America* (Washington D.C.: Center for American Progress).

Heseltine, Nigel (1971), *Madagascar* (London: Pall Mall Press).

Heyer, Judith, Stewart, Frances, and Thorp, Rosemary (eds.) (2002), *Group Behaviour and Development. Is the Market Destroying Cooperation?* (Oxford: Oxford University Press).

Hoff, Karla and Pandey, Priyanka (2006), 'Discrimination, Social Identity, and Durable Inequalities', *American Economic Review*, 96 (2), 206-11.

Hulme, David and McKay, Andrew (2007), 'Identifying and Measuring Chronic Poverty: Beyond Monetary Measures?' in Nanak Kakwani and Jacques Silber (eds.), *The Many Dimensions of Poverty* (New York: Palgrave Macmillan), 187-214.

Ibrahim, Solava S. (2006), 'From Individual to Collective Capabilities: The Capability Approach as a Conceptual Framework for Self-help ', *Journal of Human Development and Capabilities*, 7 (3), 397-416.

Jalan, Jyotsna and Ravallion, Martin (2002), 'Geographic Poverty Traps? A Micro Model of Consumption Growth in Rural China', *Journal of Applied Econometrics*, 17 (4), 329-46.

Jayadev, Arjun and Reddy, Sanjay G. (2009), 'Inequalities Between Groups: Theories and Empirics', *forthcoming in a special issue of the journal World Development on ethnicity and ethnic strife*.

Jones, Patricia (1998), 'Skill Formation and Inequality in Poor Countries: How Much do Ethnic Neighbourhoods Matter?' *Journal of African Economies*, 7 (1), 62-90.

Kabeer, Naila (2006), 'Poverty, Social Exclusion and the MDGs: The Challenge of 'Durable Inequalities' in the Asian Context', *IDS Bulletin* 37 (3), 64-78.

Kakwani, Nanak and Silber, Jacques (eds.) (2007), *The Many Dimensions of Poverty* (New York: Palgrave Macmillan).

Kanbur, Ravi (1987), 'Measurement and Alleviation of Poverty: With an Application to the Effects of Macroeconomic Adjustment', *IMF Staff Papers*, 34 (1), 60-85.

--- (2001), 'Economic Policy, Distribution and Poverty: The Nature of Disagreements', *World Development*, 29 (6), 1083-94.

--- (2003), 'Q-Squared? A Commentary on Qualitative and Quantitative Poverty Appraisal', in Ravi Kanbur (ed.), *Q-Squared: Qualitative and Quantitative Methods of Poverty Appraisal* (New Delhi: Permanent Black), 1-22.

Kanbur, Ravi (2006), 'The Policy Significance of Inequality Decompositions', *Journal of Economic Inequality*, 4, 367-74.

Kanbur, Ravi (ed.), (2003), *Q-Squared: Qualitative and Quantitative Methods of Poverty Appraisal* (New Delhi: Permanent Black).

Kanbur, Ravi and Venables, Anthony J. (2005), 'Spatial Inequality and Development', in Ravi Kanbur and Anthony J. Venables (eds.), *Spatial Inequality and Development* (Oxford: Oxford University Press), 3-11.

Kanbur, Ravi and Venables (eds.) (2005), *Spatial Inequality and Development* eds. Ravi Kanbur and Anthony J. Venables (Oxford: Oxford University Press).

Kanbur, Ravi and Shaffer, Paul (2007), 'Epistemology, Normative Theory and Poverty Analysis: Implications for Q-Squared in Practice', *World Development*, 35 (2), 183-96.

Kanbur, Ravi, Rajaram, Prem Kumar, and Varshney, Ashutosh (2009), 'Ethnic Diversity and Ethnic Strife: An Interdisciplinary Perspective', *Introduction to a forthcoming special issue of the journal World Development on ethnicity and ethnic strife.*

Kertzer, David I and Arel, Domonique (eds.) (2002), *Census and Identity: The Politics of Race, Ethnicity, and Language in National Censuses* (Cambridge: Cambridge University Press).

Koerner, Francis (1994), *Madagascar, Colonisation Française et Nationalisme Malgache: XXe Siècle* (Paris: L'Harmattan).

--- (1999), *Histoire de l'Enseignement Privé et Officiel à Madagascar* (Paris: L'Harmattan).

Krishnakumar, Jaya (2007), 'Going Beyond Functionings to Capabilities: An Econometric Model to Explain and Estimate Capabilities', *Journal of Human Development and Capabilities*, 8 (1), 39-63.

Krishnakumar, Jaya and Ballon, Paola (2008), 'Estimating Basic Capabilities: A Structural Equation Model Applied to Bolivia', *World Development*, 36 (6), 992-1010.

Kuklys, Wiebke (2005), *Amartya Sen's Capability Approach. Theoretical Insights and Empirical Applications* (Berlin: Springer).

La Porta, Rafael, et al. (1997), 'Trust in Large Organizations', *American Economic Review*, 87 (2), 333-38.

Laderchi, Caterina Ruggeri , Saith, Ruhi, and Stewart, Frances (2003), 'Does it Matter that we do not Agree on the Definition of Poverty? A Comparison of Four Approaches', *Oxford Development Studies*, 31 (3), 243 - 74.

Langer, Arnim and Ukiwo, Ukoha (2008), 'Ethnicity, Religion and the State in Ghana and Nigeria. Perceptions from the Street', in Frances Stewart (ed.), *Horizontal Inequalities and Conflict. Understanding Group Violence in Multiethnic Societies* (Basingstoke: Palgrave Macmillan), 205-26.

Lanjouw, Peter and Rao, Vijayendra (2010), *Revisiting Between-Group Inequality Measurement: An Application to the Dynamics of Caste Inequality in Two Indian Villages* (Washington D.C.: World Bank Policy Research Working Paper no. 5337).

Laurence, James (2009), 'The Effect of Ethnic Diversity and Community Disadvantage on Social Cohesion: A Multi-Level Analysis of Social Capital and Interethnic Relations in UK Communities', *European Sociological Review, forthcoming*, DOI:10.1093/esr/jcp057.

287

Lefranc, Arnaud, Pistolesi, Nicolas, and Trannoy, Alain (2008), 'Inequality of Opportunities vs. Inequality of Outcomes: Are Western Societies All Alike?' *Review of Income and Wealth*, 54 (4), 513-46.

Lehrer, Evelyn L. (1999), 'Religion as a Determinant of Educational Attainment: An Economic Perspective', *Social Science Research*, 28, 358-79.

--- (2004), 'Religion as a Determinant of Economic and Demographic Behavior in the United States', *Population and Development Review*, 30 (4), 707-26.

Long, Scott J. and Freese, Jeremy (2006), *Regression Models for Categorical Dependent Variables Using Stata* (College Station, Texas: Stata Press).

Loury, Glenn (1999), *Social Exclusion and Ethnic Groups: The Challenge to Economics* (Paper presented to the Annual World Bank Conference on Development Economics 1999, Washington D.C.).

--- (2002), *The Anatomy of Racial Inequality* (Cambridge Ma.: Harvard University Press).

Lupo, Pietro (2004), *Inégalités et Responsabilités Institutionnelles Locales à Madagascar* (Tulear, Madagascar: Groupe de Recherche Pour la Connaissance du Sud).

Lyon, Larry and Abell, Troy (1979), 'Social Mobility among Young Black and White Men: A Longitudinal Study of Occupational Prestige and Income', *The Pacific Sociological Review*, 22 (2), 201-22.

Mamdani, Mahmood (1996), *Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism* (Princeton studies in culture/power/history; Princeton, N.J.: Princeton University Press).

Manski, Charles F. (1993), 'Identification of Endogenous Social Effects: The Reflection Problem', *Review of Economic Studies*, 60, 531-542.

--- (2000), 'Economic Analysis of Social Interactions', *Journal of Economic Perspectives*, 14 (3), 115-36.

Mansuri, Ghazala and Rao, Vijayendra (2004), 'Community-based and -driven Development: A Critical Review', *The World Bank Research Observer*, 19 (1), 1-39.

Marcus, Richard M. (2004), *Political Change in Madagascar: Populist Democracy or Neopatrimonialism by Another Name?* (Pretoria, South Africa: Institute for Security Studies Working Paper no. 89).

Marcus, Richard M. and Ratsimbaharison, Adrien M (2005), 'Political Parties in Madagascar: Neopatrimonial Tools or Democratic Instruments?' *Party Politics*, 11 (4), 495-512.

Massey, Douglas (1996), 'The Age of Extremes: Concentrated Affluence and Poverty in the Twenty First Century', *Demography*, 33 (4), 395-412.

--- (2007), *Categorically Unequal: The American Stratification System* (New York: Russell Sage Foundation).

Massey, Douglas and Denton, Nancy A. (1987), 'Trends in the Residential Segregation of Blacks, Hispanics, and Asians: 1970-1980', *American Sociological Review*, 52 (6), 802-25.

--- (1993), *American Apartheid: Segregation and the Making of the Underclass* (Cambridge, Mass.: Harvard University Press).

McDade, Thomas W. and Adair, Linda S. (2001), 'Defining the "Urban" in Urbanization and Health: A Factor Analysis Approach', *Social Science & Medicine,* 53, 55-70.

Middleton, K. A. (ed.), (1999), *Ancestors, Power, and History in Madagascar* (Studies of religion in Africa ; 20, Leiden, Boston, Mass: Brill).

Minten, Bart and Barrett, Christopher B. (2008), 'Agricultural Technology, Productivity, and Poverty in Madagascar', *World Development,* 36 (5), 797-822.

Mistiaen, Johan A., et al. (2001), 'Putting Welfare on the Map in Madagascar', (Washington D.C.: The World Bank, Africa Region Working Paper Series no. 34).

Moffitt, Robert A. (2001), 'Policy Interventions, Low Level Equilibria, and Social Interactions', in Steven N. Durlauf and Peyton H. Young (eds.), *Social Dynamics* (Cambridge, Mass: MIT Press), 45-82.

Montalvo, Jose G. and Reynal-Querol, Marta (2003), 'Religious Polarization and Economic Development', *Economics Letters,* 80, 201-10.

--- (2005), 'Ethnic Polarization, Potential Conflict, and Civil Wars', *American Economic Review,* 95 (3), 796-816.

Montgomery, Mark R. , et al. (eds.) (2004), *Cities Transformed: Demographic Change and its Implications in the Developing World* (London: Earthscan and Panel on Urban Population Dynamics).

Montgomery, Mark R. and Hewett, Paul C. (2005), 'Urban Poverty and Health in Developing Countries: Household and Neighbourhood Effects', *Demography,* 42 (3), 397-425.

Morgan, Stephen L. (2006), 'Past Themes and Future Prospects for Research on Social Mobility', in Stephen L. Morgan, David B. Grusky, and Gary S. Fields (eds.), *Mobility and Inequality. Frontiers of Research in Sociology and Economics* (Stanford Ca.: Stanford University Press), 3-20.

Morgan, Stephen L., Grusky, David B., and Fields, Gary S. (eds.) (2006), *Mobility and Inequality. Frontiers of Research in Sociology and Economics* (Stanford Ca.: Stanford University Press).

Moser, Caroline (ed.), (2007), *Reducing Global Poverty. The Case for Asset Accumulation* (Washington D.C.: Brookings Institution).

Narayan, Deepa and Woolcock, Michael (2000), 'Social Capital: Implications for Development Theory, Research, and Policy', *World Bank Research Observer,* 15 (2), 225-49.

Neal, Derek (1997), 'The Effects of Catholic Secondary Schooling on Educational Achievement', *Journal of Labor Economics,* 15 (1), 98-123.

Nunez, Javier and Gutierrez, Roberto (2004), 'Class Discrimination and Meritocracy in the Labor Market: Evidence form Chile', *Estudios de Economia* 31 (2), 113-32.

Nunn, Alex, et al. (2010), *Postcode Selection? Employers' Use of Area and Address-Based Information Shortcuts in Recruitment Decisions* (London: Department for Work and Pensions Research Report 664).

Nussbaum, Martha C. (2000), *Women and Human Development: The Capabilities Approach* (Cambridge: Cambridge University Press).

--- (2003), 'The Complexity of Groups: A Comment on Jorge Valadez', *Philosophy Social Criticism,* 29 (1), 57-69.

Oaxaca, Ronald (1973), 'Male–Female Wage Differentials in Urban Labor Markets', *International Economic Review,* 14 (3), 693–709.

Ostby, Gudrun (2008), 'Inequalities, the Political Environment and Civil Conflict. Evidence from 55 Developing Countries', in Frances Stewart (ed.), *Horizontal Inequalities and Conflict. Understanding Group Violence in Multiethnic Societies* (Basingstoke: Palgrave Macmillan), 136-62.

Parker, Joseph Irving (1938), *Interpretative Statistical Survey of the World Mission of the Christian Church: Summary and Detailed Statistics of Churches and Missionary Societies, Interpretative Articles, and Indices* (New York: International Missionary Council).

Pattanaik, Prasanta K. and Xu, Yongsheng (1990), 'On Ranking Opportunity Sets in Terms of Freedom of Choice', *Recherches Economiques de Louvain,* 56 (383-390).

Pearl, Judea (2000), *Causality* (Cambridge: Cambridge University Press).

Piketty, Thomas (1995), 'Social Mobility and Redistributive Politics', *Quarterly Journal of Economics,* 110 (3), 551-84.

Raison-Jourde, Francpise (1983), 'Mission L.M.S. et Mission Jésuite Face Aux Communautés Villageoises Merina: Fondation et Fonctionnement des Paroisses Entre 1869 et 1876', *Africa: Journal of the International African Institute,* 53 (3), 55-72.

--- (1991), *Bible et Pouvoir à Madagascar au XIXe Siècle. Invention d'une Identité Chrétienne et Construction de l'État* (Paris: Karthala).

Rakotomalala, Malanjaona, Blanchy, Sophie, and Raison-Jourde, Francpise (2001), *Usages Sociaux du Religieux Sur les Hautes-terres Malgaches: Les Ancêtres au Quotidien* (Paris: L'Harmattan).

Ranis, Gustav, Stewart, Frances, and Samman, Emma (2006), 'Human Development: Beyond the Human Development Index', *Journal of Human Development and Capabilities,* 7 (3), 323-58.

Rao, Vijayendra and Walton, Michael (2004), 'Culture and Public Action: Relationality, Equality of Agency and Development', in Vijayendra Rao and Michael Walton (eds.), *Culture and Public Action* (Stanford, Ca.: Stanford University Press: Stanford Social Sciences), 3-36.

Rao, Vijayendra and Walton, Michael (eds.) (2004), *Culture and Public Action* (Stanford, Ca.: Stanford University Press: Stanford Social Sciences).

Ravallion, Martin (1992), *Poverty Comparisons - A Guide to Concepts and Methods* (Washington D.C.: The World Bank, Living Standards Measurement Surveys Working Paper no. 88).

Ravallion, Martin and Bidani, Benu (1994), 'How Robust Is a Poverty Profile?' *World Bank Economic Review,* 8, 75-102.

Rawls, John (1971), *A Theory of Justice* (Cambridge, Mass.: Harvard University Press).

Razafindravonona, Jean , Stifel, David , and Paternostro, Stefano (2001), *Evolution de la Pauvreté à Madagascar: 1993-1999* (Antananarivo: INSTAT).

Reardon, Sean and Bischoff, Kendra (2008), *Does Income Inequality Cause Income Segregation? Evidence from a Within-Race Analysis* (Paper presented at the annual meeting of the American Sociological Association Annual Meeting, Boston, Mass., July 31).

Robeyns, Ingrid (2006), 'The Capability Approach in Practice', *Journal of Political Philosophy*, 14 (3), 351-76.

--- (2008), 'Sen's Capability Approach and Feminist Concerns', in Flavio Comim, Mozaffar Qizilbash, and Sabina Alkire (eds.), *The Capability Approach: Concepts, Measures and Applications* (Cambridge: Cambridge University Press), 82-104.

Roemer, John E. (1998), *Equality of Opportunity* (Cambridge, Mass: Harvard University Press).

--- (2002), 'Equality of Opportunity: A Progress Report', *Social Choice and Welfare*, 19 (2), 455-71.

Romani, Mattia (2003), 'Poverty in Madagascar in 2001 - Poverty Profile, Marginal Effects Analysis and Some Robustness Checks', (Antananarivo: The World Bank).

Sahn, David E. and Stifel, David C. (2000), 'Poverty Comparisons Over Time and Across Countries in Africa', *World Development*, 28 (12), 2123-55.

--- (2003), 'Exploring Alternative Measures of Welfare in the Absence of Expenditure Data', *Review of Income and Wealth*, 49 (4), 463-89.

--- (2003a), 'Urban-Rural Inequality in Living Standards in Africa', *Journal of African Economies*, 12 (4), 564-97.

Sander, William (1996), 'Catholic Grade Schools and Academic Achievement', *Journal of Human Resources*, 31 (3), 540-48.

Sastry, Narayan (1996), 'Community Characteristics, Individual and Household Attributes, and Child Survival in Brazil', *Demography*, 33 (2), 211-29.

Savage, Mike (1997), 'Social Mobility and the Survey Method: A Critical Analysis', in Daniel Bertaux and Paul Thompson (eds.), *Pathways to Social Class: A Qualitative Approach to Social Mobility* (Oxford: Clarendon Press), 299-325.

Schellenberg, Joanna A., et al. (2003), 'Inequities among the Very Poor: Health Care for Children in Rural Southern Tanzania', *The Lancet*, 361, 561-66.

Sen, Amartya K. (1976), 'Poverty: An Ordinal Approach to Measurement', *Econometrica*, 44 (2), 219-31.

--- (1983), *Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford: Oxford University Press).

--- (1985), *Commodities and Capabilities* (Amsterdam: North-Holland).

--- (1985a), 'Well-being, Agency and Freedom: The Dewey Lectures 1984', *Journal of Philosophy*, 82 (4), 169-221.

Sen, Amartya K. (1987), *The standard of living: the Tanner lectures, Clare Hall, Cambridge, 1985* (The Tanner lectures on human values; Cambridge: Cambridge University Press) xiv,125p.

Sen, Amartya K. (1988), 'Freedom of Choice: Concept and Content', *European Economic Review*, 32, 269-94.

--- (1992), *Inequality Reexamined* (Oxford: Oxford University Press).

--- (1993), 'Capability and Well-being', in Martha C. Nussbaum and Amartya
　　　Kumar Sen (eds.), *The Quality of Life* (Oxford: Oxford University Press),
　　　30-53.

--- (2000), *Development as Freedom* (New Delhi: Oxford University Press).

--- (2006), 'Conceptualizing and Measuring Poverty', in David B. Grusky and
　　　Ravi Kanbur (eds.), *Poverty and Inequality* (Stanford Ca.: Stanford
　　　University Press), 30-46.

Sen, Amartya K. and Foster, James A. (1997), 'Annexe: On Economic Inequality
　　　After a Quarter Century', *Sen, Amartya K.: On Economic Inequality*
　　　(Oxford: Oxfrord University Press), 107-220.

Seth, Suman (2009), 'Inequality, Interactions and Human Development', *Journal
　　　of Human Development and Capabilities,* 10 (3), 375-96.

Shady, Norbert (2002), 'Picking the Poor: Indicators for Geographic Targeting in
　　　Peru', *Review of Income and Wealth,* 48 (3), 417-33.

Shaffer, Paul (2003), 'Difficulties in Combining Income/Consumption and
　　　Participatory Approaches to Poverty: Issues and Examples', in Ravi
　　　Kanbur (ed.), *Q-Squared: Qualitative and Quantitative Methods of
　　　Poverty Appraisal* (New Delhi: Permanent Black), 126-31.

Shepherd, Andrew , et al. (2004), *Bridging the North South Divide in Ghana.
　　　Background Paper for the World Development Report 2006 Equity and
　　　Development* (Washington D.C: The World Bank).

Shorrocks, Anthony (1980), 'The Class of Additively Decomposable Inequality
　　　Measures', *Econometrica,* 48, 613-25.

--- (1984), 'Inequality Decompositions by Population Subgroups', *Econometrica,*
　　　52, 1369-85.

Shorrocks, Anthony and Wan, Guanghua (2005), 'Spatial Decompositions of
　　　Inequality', *Journal of Economic Geography,* 5 (1), 59-81.

Silver, Hilary (1994), 'Social Exclusion and Social Solidarity: Three Paradigms',
　　　International Labour Review, 135 (5-6), 531-78.

Steele, Claude M. (1999), 'Thin Ice: "Stereotype Threat" and Black College
　　　Students', *The Atlantic Monthly,* 284 (2), 44-54.

Stewart, Frances (2002), *Horizontal Inequality: A Neglected Dimension of
　　　Development.* (Helsinki: UNU World Institute for Development
　　　Economics Research, 5th WIDER Annual Lecture).

--- (2005), 'Groups and Capabilities', *Journal of Human Development and
　　　Capabilities,* 6 (2), 185-204.

--- (2009), 'Horizontal Inequality: Two Types of Trap', *Journal of Human
　　　Development and Capabilities,* 10 (3), 315-40.

--- (2009a), *Religion Versus Ethnicity as a Source of Mobilisation: Are There
　　　Differences?* (Oxford Centre for Research on Inequality, Human Security
　　　and Ethnicity Working Paper no. 70).

Stewart, Frances (ed.), (2008), *Horizontal Inequalities and Conflict.
　　　Understanding Group Violence in Multiethnic Societies* (Basingstoke:
　　　Palgrave Macmillan).

Stewart, Frances, Brown, Graham, and Mancini, Luca (2005), *Why Horizontal
　　　Inequalities Matter: Some Implications for Measurement* (Oxford Centre

for Research on Inequality, Human Security and Ethnicity Working Paper
no. 19).

Stewart, Frances, Brown, Graham, and Langer, Arnim (2007), *Policies Towards
Horizontal Inequalities* (Oxford Centre for Research on Inequality,
Human Security and Ethnicity Working Paper no. 42).

Stewart, Frances, Brown, Graham, and Cobham, Alex (2009), *The Implications of
Horizontal and Vertical Inequalities for Tax and Expenditure Policies*
(Oxford: Centre for Research on Inequality, Human Security and
Ethnicity Working Paper no. 65).

Stifel, David , Minten, Bart, and Randrianarison, Lalaina (2003), 'Eloignement,
Routes, Agriculture et Pauvreté', in Bart Minten, Jean-Claude
Randrianarisoa, and Lalaina Randrianarison (eds.), *Agriculture, Pauvreté
Rurale et Politiques Economiques à Madagascar* (Antananarivo: Projet
ILO), 68-71.

Stifel, David C., Forster, Felix, and Barrett, Christopher B. (2008), *The Evolution
of Horizontal Inequalities in Madagascar, 1999-2005* (Ithaca, NY:
Cornell University, Strategies and Analysis for Growth and Access
(SAGA) Working Paper).

Streeten, Paul (1981), *First Things First: Meeting Basic Human Needs in the
Developing Countries* (Oxford Oxford University Press).

Subramanian, S. (2009), 'Poverty Measurement in the Presence of a 'Group-
Affiliation' Externality', *Journal of Human Development and
Capabilities,* 10 (1), 63-76.

Sudgen, Robert (1993), 'Welfare, Resources and Capabilities: A Review of
Inequality Reexamined by Amartya Sen', *Journal of Economic Literature,*
31 (4), 1947-62.

Tarrow, Sidney (1995), 'Bridging the Quantitative-Qualitative Divide in Political
Science', *American Political Science Review,* 89 (2), 471-74.

Teschl, Miriam and Derobert, Laurent (2008), 'Does Identity Matter? On the
Relevance of Identity and Interactions for Capabilities', in Flavio Comim,
Mozaffar Qizilbash, and Sabina Alkire (eds.), *The Capability Approach:
Concepts, Measures and Applications* (Cambridge: Cambridge University
Press), 125-56.

Thorbecke, Erik (2007), 'Multidimensional Poverty: Conceptual and
Measurement Issues', in Nanak Kakwani and Jacques Silber (eds.), *The
Many Dimensions of Poverty* (New York: Palgrave Macmillan), 3-19.

Tilly, Charles (1998), *Durable Inequality* (Berkeley, Ca.: University of California
Press).

Townsend, Peter (1979), *Poverty in the United Kingdom: A Survey of Household
Resources and Standards of Living* (Harmondsworth: Penguin).

UNDP (1990), 'Human Development Report 1990', (New York: United Nations
Development Program and Oxford University Press).

United Nations (2009), *The Millennium Development Goals Report* (New York).

Van de Walle, Dominique P. and Gunewardena, Dileni (2001), 'Sources of Ethnic
Inequality in Vietnam', *Journal of Development Economics,* 65 (1), 177-
207.

Wan, Guanghua and Zhou, Zhangyue (2005), 'Income Inequality in Rural China: Regression-based Decomposition Using Household Data', *Review of Development Economics* 9(1), 107-20.

Whyte, John (1983), "How much discrimination was there under the Unionist regime, 1921-1968?' in Tom Gallagher and James O'Connell (eds.), *Contemporary Irish Studies* (Manchester: Manchester University Press).

Wilson, William Julius (1978), *The Declining Significance of Race. Blacks and Changing American Institutions* (Chicago: University of Chicago Press).

Wilson, William J. (1987), *The Truly Disadvataged. The Inner City, the Underclass and Public Policy* (Chicago: University of Chicago Press).

Wolff, Jonathan and De-Shalit, Avner (2007), *Disadvantage* (Oxford: Oxford University Press).

Woodberry, Robert D. (2004), 'The Shadow of Empire: Christian Missions, Colonial Policy, and Democracy in Postcolonial Societies', (Doctoral Thesis submitted to the Department of Sociology, University of North Carolina).

World Bank (2002), *Education and Training in Madagascar: Towards a Policy Agenda for Economic Growth and Poverty Reduction* (Washington D.C.).

--- (2004), *Decentralization in Madagascar* (Washington D.C.).

--- (2006), *Word Development Report 2006: Equity and Development* (Washington D.C.).

--- (2006a), *Madagascar Country Assistance Evaluation* (Washington D.C.).

--- (2007), *Country Assistance Strategy for the Republic of Madagascar* (Washington D.C.).

--- (2008), *Madagascar Poverty Reduction Strategy Paper Progress Report and Joint Staff Advisory Note* (Washington D.C.).

--- (2008a), *Africa Development Indicators 2007* (Washington D.C.).

--- (2008b), *Fifth Poverty Reduction Support Credit, Programme Document* (Washington D.C.: The World Bank, report no. 43274-MG).

Zhang, Xiaobo and Kanbur, Ravi (2001), 'What Difference Do Polarisation Measures Make? An Application to China', *Journal of Development Studies,* 37 (3), 85-98.

--- (2005), 'Spatial Inequality in Education and Health Care in China', *China Economic Review,* 16, 189-204.