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## Essays on health and poverty in Morocco

Raphael Cottin

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**THÈSE DE DOCTORAT**

**DE L'UNIVERSITÉ PSL**

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**Essays on health and poverty in Morocco**

Soutenue par

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**Ecole doctorale de Dauphine**

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# Contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Introduction: health, poverty, and social protection in Morocco</b>   | <b>19</b> |
| 1.1      | Introduction . . . . .   | 21        |
| 1.2      | Health, poverty and social protection in the developing world . . . . .  | 22        |
| 1.2.1    | An overview of the link between health and poverty . . . . .   | 22        |
| 1.2.2    | Social protection in health : historical and political perspectives . . . . .  | 25        |
| 1.3      | Morocco in the Middle East and North Africa region . . . . .   | 28        |
| 1.3.1    | Similar dynamics with regards to demography, education, and the labor market . . . . .                                 | 28        |
| 1.3.2    | Lower outcomes in health and poverty . . . . .   | 33        |
| 1.3.3    | Social protection in Morocco and the MENA region . . . . .   | 35        |
| 1.4      | Why a thesis on health and poverty in Morocco? . . . . .   | 39        |
| 1.4.1    | The outcome of a personal journey . . . . .  | 39        |
| 1.4.2    | The lack of applied microeconomic research on Morocco . . . . .  | 40        |
| 1.4.3    | Obstacles and their resolution . . . . .   | 43        |
| 1.5      | Contribution of this thesis . . . . .  | 45        |
| 1.5.1    | Dataset used in this thesis . . . . .  | 45        |
| 1.5.2    | Summary of the chapters . . . . .  | 45        |
|          | References . . . . .   | 48        |
|          | Appendices . . . . .   | 55        |
| 1.A      | Additional figures . . . . .   | 55        |
| 1.B      | Additional table . . . . .   | 59        |
| <b>2</b> | <b>Free health care for the poor: a good way to achieve universal health coverage? Evidence from the RAMED program</b> | <b>61</b> |
| 2.1      | Introduction . . . . .   | 63        |
| 2.2      | Country and policy context . . . . .   | 65        |
| 2.3      | Relevant Literature . . . . .  | 70        |
| 2.4      | Data and empirical strategy . . . . .  | 73        |
| 2.4.1    | Data . . . . .   | 73        |

---

|          |   |            |
|----------|---|------------|
| 2.4.2    | Empirical strategy . . . . .  | 74         |
| 2.5      | Targeting and the (im)possibility of a regression-discontinuity design . . .                        | 75         |
| 2.6      | Descriptive statistics . . . . .  | 79         |
| 2.7      | Results . . . . .   | 81         |
| 2.7.1    | Affiliation to RAMED . . . . .  | 81         |
| 2.7.2    | Consultation . . . . .  | 86         |
| 2.7.3    | Health expenditures . . . . .   | 91         |
| 2.7.4    | Covariate balance and common support . . . . .  | 93         |
| 2.8      | Conclusion and discussion . . . . .   | 93         |
|          | References . . . . .  | 98         |
|          | Appendices . . . . .  | 103        |
| 2.A      | Targeting of RAMED . . . . .  | 103        |
| 2.B      | Additional figures . . . . .  | 111        |
| 2.C      | Additional tables . . . . .   | 113        |
| <b>3</b> | <b>Caring or coping? Labor market effects of illness in the household</b>                           | <b>119</b> |
| 3.1      | Introduction . . . . .  | 121        |
| 3.2      | Literature review . . . . .   | 122        |
| 3.3      | Family labor response supply to severe health shocks and the value of<br>health insurance . . . . . | 127        |
| 3.4      | Methodology . . . . .   | 129        |
| 3.4.1    | Sample restriction . . . . .  | 129        |
| 3.4.2    | Empirical specification . . . . .   | 130        |
| 3.5      | Descriptive statistics . . . . .  | 132        |
| 3.6      | Results . . . . .   | 138        |
| 3.6.1    | Own illness . . . . .   | 138        |
| 3.6.2    | Cross effects : illness of household head or spouse on children . .                                 | 142        |
| 3.6.3    | Youth unemployment, inactivity, and head illness . . . . .  | 144        |
| 3.6.4    | Other coping mechanisms . . . . .   | 145        |
| 3.7      | Mechanisms and robustness . . . . .   | 147        |
| 3.7.1    | Mechanisms: interaction with health insurance . . . . .   | 147        |
| 3.7.2    | Different indicators of health shock . . . . .  | 149        |
| 3.7.3    | Additional robustness tests . . . . .   | 152        |
| 3.8      | Conclusion . . . . .  | 155        |
|          | References . . . . .  | 157        |
|          | Appendices . . . . .  | 163        |
| 3.A      | Additional tables . . . . .   | 163        |

---

|          |   |            |
|----------|---|------------|
| 3.B      | Additional figures . . . . .  | 170        |
| <b>4</b> | <b>The anatomy of poverty perceptions in Morocco : what is the role of local comparisons?</b> | <b>171</b> |
| 4.1      | Introduction . . . . .  | 172        |
| 4.2      | Relevant literature . . . . .   | 174        |
| 4.3      | Data and methodology . . . . .  | 177        |
| 4.3.1    | Data . . . . .  | 177        |
| 4.3.2    | Methodology . . . . .   | 177        |
| 4.4      | Descriptive statistics . . . . .  | 180        |
| 4.5      | Results . . . . .   | 183        |
| 4.5.1    | Baseline results . . . . .  | 183        |
| 4.5.2    | Comparison effects . . . . .  | 186        |
| 4.5.3    | Channels: inequality, local public goods or social ties? . . . . .                            | 189        |
| 4.6      | Robustness : fixed effects ordered logit . . . . .  | 194        |
| 4.7      | Conclusion and discussion . . . . .   | 197        |
|          | References . . . . .  | 199        |
|          | Appendices . . . . .  | 205        |
| 4.A      | Additional tables . . . . .   | 205        |
| 4.B      | Additional figures . . . . .  | 210        |

---

# List of Figures

|       |  |     |
|-------|--|-----|
| 1.1   | Urbanization, 1980-2017 . . . . .  | 29  |
| 1.2   | Average per capita GDP growth, by sub-period . . . . .                                       | 34  |
| 1.3   | Number of publications, by country and themes, 1990-2018 . . . . .                           | 43  |
| 1.A.1 | Morocco: absolute poverty headcount . . . . .  | 55  |
| 1.A.2 | Dependency ratio and share of the elderly in the population . . . . .                        | 56  |
| 1.A.3 | Youth unemployment rate . . . . .  | 56  |
| 1.A.4 | Enrollment rate in primary and secondary schooling . . . . .                                 | 57  |
| 1.A.5 | Morocco: tertiary education, gross enrollment rate . . . . .                                 | 57  |
| 1.A.6 | Spending of Health Ministry per inhabitant, by region, 2013 . . . . .                        | 58  |
| 2.1   | Consultation rates by consumption quintile, 2012 (source: ONDH) . . . .                      | 67  |
| 2.2   | Fes University Hospital : number of patients by health coverage status,<br>2011-14 . . . . . | 69  |
| 2.3   | Affiliation to RAMED in 2013 by theoretical eligibility criteria, urban . .                  | 78  |
| 2.4   | Affiliation to RAMED in 2013 by theoretical eligibility criteria, rural . . .                | 79  |
| 2.5   | Consultation rates by year and coverage type . . . . .                                       | 80  |
| 2.A.1 | Ex-ante distribution of the socio-economic score in 2012, rural . . . . .                    | 104 |
| 2.A.2 | Ex-ante distribution of the patrimonial score in 2012, rural . . . . .                       | 105 |
| 2.A.3 | Affiliation to RAMED in 2015 by theoretical eligibility criteria, rural . . .                | 106 |
| 2.A.4 | Ex-ante distribution of the socio-economic score in 2012, urban . . . . .                    | 108 |
| 2.A.5 | Ex-ante distribution of the criteria-weighted income per capita, urban . . .                 | 109 |
| 2.A.6 | Affiliation to RAMED in 2015 by theoretical eligibility criteria, urban . .                  | 110 |
| 2.B.1 | Consultation rates by year and coverage type . . . . .                                       | 111 |
| 2.B.2 | Propensity score matching: common support at baseline . . . . .                              | 112 |
| 3.1   | Health as source of concern among households, by year and residency . .                      | 123 |
| 3.2   | household revenue and consumption per head, by illness of household head                     | 134 |
| 3.3   | Labour force participation by illness of household head . . . . .                            | 135 |
| 3.B.1 | Transfers and credits, by illness of household head . . . . .                                | 170 |

---

|       |   |     |
|-------|---|-----|
| 4.1   | Transition probabilities between subjective poverty status (all years)                  | 181 |
| 4.2   | Subjective poverty by consumption quintile  | 182 |
| 4.B.1 | Transition probabilities between subjective poverty status, by residency<br>(all years) | 210 |
| 4.B.2 | Transition probabilities between subjective poverty status, by year (na-<br>tional)     | 211 |
| 4.B.3 | Empirical cumulative distribution of consumption per person, by subjec-<br>tive poverty | 211 |

# List of Tables

|       |  |     |
|-------|--|-----|
| 1.1   | Health financing indicators, by income group and region (2016)                 | 24  |
| 1.2   | Demography: selected indicators by groups of countries                         | 30  |
| 1.3   | Labor market indicators, by groups of countries                                | 32  |
| 1.4   | Literacy rates, by groups of countries   | 32  |
| 1.5   | absolute poverty rates at World Bank lines, by country                         | 35  |
| 1.6   | Indicators of health outcomes, by groups of countries                          | 36  |
| 1.7   | Indicators of health spending, by groups of countries                          | 36  |
| 1.8   | Academic publications: 10 most frequent subjects, by country                   | 42  |
| 1.B.1 | Keywords used for the construction of figure 1.3                               | 59  |
| 2.1   | national indicators on health and health care                                  | 66  |
| 2.2   | Panel structure  | 74  |
| 2.3   | Covariates, by residency and coverage status                                   | 76  |
| 2.4   | Outcome variables, by year   | 81  |
| 2.5   | Covariates, by residency and coverage status                                   | 82  |
| 2.6   | probit model of RAMED affiliation in 2013, by residency                        | 83  |
| 2.7   | probit model of new RAMED affiliation in 2015, by residency                    | 85  |
| 2.8   | Matching Diff-in-Diff : consultation (0/1), by residency and time period       | 87  |
| 2.9   | Matching Diff-in-Diff : consultation by sector, 2012-2013                      | 88  |
| 2.10  | Matching Diff-in-Diff : consultation by sector, 2013-2015                      | 89  |
| 2.11  | Matching Diff-in-Diff : consultation by type, 2012-2013                        | 89  |
| 2.12  | Matching Diff-in-Diff : consultation by type, 2013-2015                        | 90  |
| 2.13  | Matching Diff-in-Diff : Health expenditures, national                          | 92  |
| 2.14  | Matching Diff-in-Diff : Health expenditures, 2012-2015, by residency           | 94  |
| 2.A.1 | Eligibility criteria for RAMED in rural areas: patrimonial score               | 103 |
| 2.A.2 | Eligibility criteria for RAMED in rural areas: socio-economic score            | 104 |
| 2.A.3 | Eligibility criteria for RAMED in urban areas: socio-economic score            | 107 |
| 2.A.4 | Eligibility criteria for RAMED in urban areas: weights of self-declared income | 108 |



---

|       |  |     |
|-------|--|-----|
| 2.C.1 | probit model of RAMEd affiliation in 2015, by residency . . . . .  | 113 |
| 2.C.2 | covariate balance test, by residency, baseline . . . . .   | 114 |
| 2.C.3 | Diff-in-diff matching: consultation (0/1), 2012-15 . . . . .   | 115 |
| 2.C.4 | Matching Diff-in-Diff : consultation by sector, 2012-2015 . . . . .  | 115 |
| 2.C.5 | Matching Diff-in-Diff : consultation by type, 2012-2015 . . . . .  | 116 |
| 2.C.6 | Matching Diff-in-Diff : Health expenditures, 2012-2013, by residency . .                                   | 117 |
| 2.C.7 | Matching Diff-in-Diff : Health expenditures, 2013-2015, by residency . .                                   | 118 |
|       |  |     |
| 3.1   | Structure of the data . . . . .  | 129 |
| 3.2   | Summary of dependent variables, by gender and residency . . . . .  | 132 |
| 3.3   | Illness by type and relation to household head, all waves . . . . .  | 133 |
| 3.4   | Summary statistics of covariates, by residency . . . . .   | 136 |
| 3.5   | Covariates by illness of household head, 2012 . . . . .  | 138 |
| 3.6   | baseline specification (own illness), national . . . . .   | 139 |
| 3.7   | own illness, by link to household head, fixed effects . . . . .  | 141 |
| 3.8   | illness of household head, by gender, fixed effects . . . . .  | 143 |
| 3.9   | illness of spouse, other household members, fixed effects . . . . .  | 144 |
| 3.10  | unemployment and labour force participation of children, fixed effects . .                                 | 145 |
| 3.11  | student, inactive, and housewife status of children, fixed effects . . . . .                               | 146 |
| 3.12  | coping mechanisms and illness of household head, all other members,<br>fixed effects . . . . .             | 147 |
| 3.13  | head illness, interaction with health insurance, all other members, fixed<br>effects . . . . .             | 149 |
| 3.14  | head illness, interaction with education of respondent . . . . .   | 150 |
| 3.15  | Different illness indicators of household head, all other members, by gen-<br>der, fixed effects . . . . . | 151 |
| 3.16  | Different illness indicators of spouse, all other members, by gender, fixed<br>effects . . . . .           | 153 |
| 3.A.1 | Covariates by illness of household head, men, 2012 . . . . .   | 163 |
| 3.A.2 | Covariates by illness of household head, women, 2012 . . . . .   | 164 |
| 3.A.3 | baseline: own illness, fixed effect, by residency . . . . .  | 165 |
| 3.A.4 | illness of household head, different outcomes, fixed effects, by detailed<br>illness status . . . . .      | 166 |
| 3.A.5 | detailed illness of spouse, other household members, fixed effects . . . .                                 | 167 |
| 3.A.6 | Robustness to bad controls . . . . .   | 167 |
| 3.A.7 | Fixed effects vs. first differences . . . . .  | 168 |
| 3.A.8 | Fixed effects vs. first differences . . . . .  | 168 |
| 3.A.9 | Test of strict exogeneity of head illness . . . . .  | 169 |

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|       |   |     |
|-------|---|-----|
| 3.A.1 | Test of strict exogeneity of spouse illness . . . . .                       | 169 |
| 3.A.1 | Multiple comparison test based on interaction model . . . . .               | 169 |
| 4.1   | Subjective poverty by residency (all years) . . . . .                       | 180 |
| 4.2   | Subjective poverty by year (national) . . . . .                             | 181 |
| 4.3   | Household characteristics, by subjective poverty . . . . .                  | 183 |
| 4.4   | perceived poverty : baseline results . . . . .                              | 184 |
| 4.5   | Relative income effects on perceived poverty, overall . . . . .             | 187 |
| 4.6   | Reference consumption based on the median of the comparison group . . . . . | 188 |
| 4.7   | comparison effect: interaction models . . . . .                             | 190 |
| 4.8   | Channels: local public goods . . . . .                                      | 191 |
| 4.9   | Channel : social capital . . . . .  | 193 |
| 4.10  | Channels : local inequality . . . . .                                       | 195 |
| 4.11  | Fixed effect ordered logit estimations . . . . .                            | 196 |
| 4.A.1 | Reference income based on the mean of the comparison groups . . . . .       | 205 |
| 4.A.2 | Determinants of subjective poverty: work and health . . . . .               | 206 |
| 4.A.3 | Transition matrices by residency and time period . . . . .                  | 207 |
| 4.A.4 | Reference consumption based on the mean of the comparison group . . . . .   | 208 |
| 4.A.5 | Channels : inequality, by area . . . . .                                    | 208 |
| 4.A.6 | Inequality channel, IQR instead of SD . . . . .                             | 209 |



# Chapter 1

## Introduction: health, poverty, and social protection in Morocco

### Contents

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|            |  |           |
|------------|--|-----------|
| <b>1.1</b> | <b>Introduction</b>  | <b>21</b> |
| <b>1.2</b> | <b>Health, poverty and social protection in the developing world</b>         | <b>22</b> |
| 1.2.1      | An overview of the link between health and poverty                           | 22        |
| 1.2.2      | Social protection in health : historical and political perspectives          | 25        |
| <b>1.3</b> | <b>Morocco in the Middle East and North Africa region</b>                    | <b>28</b> |
| 1.3.1      | Similar dynamics with regards to demography, education, and the labor market | 28        |
| 1.3.2      | Lower outcomes in health and poverty   | 33        |
| 1.3.3      | Social protection in Morocco and the MENA region                             | 35        |
| <b>1.4</b> | <b>Why a thesis on health and poverty in Morocco?</b>                        | <b>39</b> |
| 1.4.1      | The outcome of a personal journey  | 39        |
| 1.4.2      | The lack of applied microeconomic research on Morocco                        | 40        |
| 1.4.3      | Obstacles and their resolution   | 43        |
| <b>1.5</b> | <b>Contribution of this thesis</b>   | <b>45</b> |
| 1.5.1      | Dataset used in this thesis  | 45        |
| 1.5.2      | Summary of the chapters  | 45        |
|            | <b>References</b>  | <b>48</b> |
|            | <b>Appendices</b>  | <b>55</b> |
| <b>1.A</b> | <b>Additional figures</b>  | <b>55</b> |

**1.B Additional table . . . . . 59**

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## 1.1 Introduction

One of the many paradoxes of the globalization age is that extreme poverty is no longer exclusively a poor country phenomenon. In a recent article, Lucy Page and Rohini Pande note that while in 1987, “90 % of the world’s poor lived in low-income countries... by 2013, over 60% percent of the world’s poor lived in middle-income counties”, in particular in “high poverty middle-income countries” such as India, Nigeria, China, Indonesia, the Philippines, South Africa (Page and Pande, 2018).

This distinction matters, because the challenge of reducing poverty is of a different nature in those two groups of countries. While in low-income setting, alleviating poverty is likely to rely mainly on direct transfers of resources, in the form of cash or in nature, financed in great part through foreign aid, Page and Pande argue that money will not be enough to eradicate poverty in middle-income country. Such a task will need a complementary focus on “invisible infrastructure”, or “the social and human systems that enable citizens to realize their capabilities and escape poverty” (Page and Pande, 2018, p. 176).

One prominent example of this “invisible infrastructure” is health care. The global health community has recently given a lot of importance on the goal of Universal Health Coverage, or UHC, the process of extending the existing social arrangements regarding health care coverage in three directions : towards the greatest amount of health goods and services covered, for the greatest number of people, and for the greatest proportion of the expenditures incurred by the patients (Schmidt, Gostin, and Emanuel, 2015). A 2012 special edition of the *Lancet* christened that the move towards UHC “the third global health transition” (after the demographic and the epidemiological transition) (Rodin and de Ferranti, 2012), while *The Economist* magazine considered UHC “an affordable necessity”. The “necessity” part is easy to understand: health is a basic component of every conceivable conception of a good life, and everybody faces shocks and setback during their lifetime (Ortiz, 2018). The view that such a necessity is “affordable” comes from calculation such as the one by Chichon (2018), purporting to show that nearly all countries could close most of their health gap at a “manageable” cost for public finances (i.e., 5% of GDP).

Whatever one thinks of such calculations, they point to the fact that extending health coverage is about more than money. The most important question is not whether or not to extend health coverage, but how to achieve it. There is no one-size-fits all template, and different countries have followed different strategies; hence the importance of examining in detail specific country experiences.

This thesis consists in three essays that look at the various aspects of the interplay between health, poverty, and health care, in the case of Morocco. The issue of health is

somewhat understudied from an economic point of view in North Africa, and singularly in the case of Morocco (see *infra*, 1.4.2); yet, several characteristics of these countries make the examination of these issues particularly relevant. Maghreb countries belong to the World Bank's "Middle Income" classification; contrary to other countries in this category, for instance South Asian countries, they have followed a development path that relied more heavily on state intervention (Richards and Waterbury, 2008). The demography and the labor markets of these countries also share similarities, such as the relatively high share of the urban population relying on government jobs, a structurally high youth unemployment rate despite increasing education levels (Campante and Chor, 2012) and a low female labor force participation (Gaddis and Klasen, 2014; Rauch and Kostyshak, 2009).

This introductory chapters gives background information on the specific issues addressed by this dissertation. It presents in a piecemeal manner several points that do not bear directly on the understanding of the chapters, but that may complement the specific points developed in the rest of the chapters. Section 1.2 gives an broad overview at the link between health, healthcare and poverty, as well as some historical perspectives on the development of social protection. Section 1.3 presents some stylized facts on the economic and social environment of Morocco and the Middle East and North Africa region. Section 1.4 presents the motivation for this thesis, personal as well as scientific. Finally, section 1.5 summarizes the contributions made by this dissertation.

## **1.2 Health, poverty and social protection in the developing world**

### **1.2.1 An overview of the link between health and poverty**

**The double link between income and health** In the developing world, health and poverty are inextricably linked. Health is important both intrinsically, as a basic component of human well-being, as well as a precondition for the enjoyment of other goods and services (Sen, 2002). But health is also relevant in an instrumental sense, as a determinant of living standards (Berthélemy and Thuilliez, 2013).

At the household level, the link between health and poverty runs through various channels. Health shocks are a source of risk for the livelihood of households, as illness can prevent individuals from working. But the reverse mechanism exists as well: being poor is associated with worse health indicators (Cutler, Deaton, and Lleras-Muney, 2006; Lleras-Muney, 2018; Smith, 1999). In the context of low income countries, nutrition has been put forward as one of the main channels through which poverty leads to worse

health, thus creating a self-reinforcing mechanism (Strauss and Thomas, 1998), although it is still a matter of debate whether or not such linkages can create economy-wide poverty traps (Bloom and Canning, 2000; Kraay and McKenzie, 2014).

Additionally, health is linked to poverty through medical expenses. Since formal health insurance is rare, health expenditures can reach important proportions of household's incomes. These "catastrophic health expenditures" are widespread in places where direct payments constitute the primary source of healthcare financing (Xu et al., 2003). One implication is that poverty indicators may be underestimated in those countries, as important health payments contribute to exacerbate poverty (Van Doorslaer et al., 2006)

The dual link between health and poverty is often observed at the level of the household or the individual; yet, both health and poverty depend of factors that are outside of the household's control, such as epidemics, droughts or other climate events (Dercon, 2002). Similarly, some of the inputs in the health production function are public goods, like sanitation infrastructure, health care supply, or parasite eradication campaigns (Bleakley, 2007; Cutler and Miller, 2005). Thus, the health-poverty nexus has inevitably a social and political dimension.

The evolution of global health in the past 50 years provides some ground for optimism. Life expectancy has progressed globally, through the combined effect of economic development as well as through medical innovation (Deaton, 2013). Since the year 2000, official development aid linked to health as increased (Berthélemy and Thuilliez, 2013; Moatti and Ventelou, 2009). New financing initiatives and vertical programs such as GAVI and the Global Fund have led to a renewed reduction in infant mortality across the globe.

**New challenges for developing countries health systems** Economic development brings a new set of issues to the fore. A number of developing countries are currently experiencing at a faster pace the demographic and epidemiological transitions that took centuries to unfold in developed countries. While these evolutions are signs of progress, they also make new demands on health systems, which have to deal with the prospects of population ageing as well as the increased prevalence of chronic disease (Riley, 2005).

On top of these demands, countries growing out of low-income status have to rely to a greater extent domestic financing for their healthcare systems (Mills and Hsu, 2014). Table 1.1 displays indicators of the structure of health financing across country income groups for the year 2016. In low incomes countries (LICs), external support represents on average 29% of current health expenditure (CHE). This amount is reduced to 11% of CHE for lower middle income countries (LMICs), and to 5% of CHE for upper middle



**Table 1.1** – Health financing indicators, by income group and region (2016)

|                          | Current health expenditure per capita (PPP) | Current health expenditure (% GDP) | External health expenditure (% CHE) | General government health expenditure (% CHE) | Private health expenditure (% CHE) | Out-of-pocket expenditure (% CHE) |
|--------------------------|---|------------------------------------|-------------------------------------|---|------------------------------------|-----------------------------------|
| <i>Income group</i>      |   |                                    |                                     |   |                                    |                                   |
| LIC                      | 105   | 6.4                                | 28.5                                | 25.6  | 46                                 | 39.6                              |
| LMIC                     | 335   | 5.6                                | 11.3                                | 42.7  | 46                                 | 40.8                              |
| UMIC                     | 983   | 6.8                                | 5                                   | 57.5  | 38                                 | 30.7                              |
| HIC                      | 3432  | 7.8                                | 0.7                                 | 71.3  | 28.3                               | 21.6                              |
| <i>Regional Grouping</i> |   |                                    |                                     |   |                                    |                                   |
| Africa                   | 290   | 5.8                                | 21                                  | 36.1  | 42.9                               | 34.8                              |
| Americas                 | 1386  | 7.1                                | 2.5                                 | 57  | 40.6                               | 32.3                              |
| Eastern Mediterranean    | 1431  | 5.3                                | 3.5                                 | 51.7  | 44.8                               | 38.9                              |
| Europe and Central Asia  | 2731  | 7.9                                | 0.9                                 | 63.9  | 35.6                               | 31.5                              |
| South-East Asia          | 431   | 4.6                                | 6.5                                 | 45  | 48.5                               | 41.4                              |
| Western Pacific          | 1221  | 7.3                                | 17.4                                | 59.2  | 25.3                               | 19.6                              |

Source: WHO, Global Health Expenditure database. LIC : Low Income Countries; LMIC : Lower Middle Income Countries; UMIC : Upper Middle Income Countries; HIC : High Income Countries note: regional groupings follow the WHO classification and may differ with the World Bank classification used in part 1.3.2

income countries (UMICs).

Another source of variation in health financing is the extent to which countries rely on direct payments, or out-of-pocket (OOP) expenditures. In LICs and LMICs, this source of financing represents around 40% of CHE. This share drops to 31% of CHE in UMICs, and 22% of CHE in HICs.

Direct payments are only one part of private health expenditure. Pre-payment mechanisms, such as social health insurance, can be an important component of health financing. But, as the difference between column 5 and 6 of table 1.1 makes clear, these represent only a small amount of health expenditure in LICs and LMICs (between 5% and 6% of CHE). Yet cross-country comparison show that the share of health expenditure that is financed through prepayment mechanism is correlated negatively with the prevalence of catastrophic health expenditures (Xu et al., 2007).

**Universal Health Coverage in developing countries** As the bottom panel from table 1.1 shows, there is a high degree of variability in the structure of health care financing, even among developing countries. The extension of social protection in health is currently enjoying a renewed interest across the developing world. According to the The World Bank’s *State of Social Safety Nets* Report (World Bank, 2018a), the amount spent on safety nets and social assistance programs has increased globally since the year 2000, both in absolute amounts as well as in proportion of GDP. The goal of “Universal Health Coverage” (UHC) has been explicitly adopted by all main international organiza-

tions. A number of low and middle income countries (most notably Rwanda, Vietnam, the Philippines) have made significant progress towards this goal by increasing coverage rates as well as decreasing the burden of out-of-pocket expenditures. These countries use a variety of different approaches that do not lend themselves to classification according to traditional typologies; yet some common patterns emerge. According to Lagomarsino et al. (2012), the countries that have succeeded in bringing down OOP expenditures have usually started by increasing their public health budget; they rely on part on increased enrollment in government health insurance, together with subsidized adhesion for low-income households; finally, they all put in place a third-party buying agency in order to strengthen demand-based financing.

Other countries have chosen a different approach to UHC, by reversing the previously dominant policy of user fees and providing free health care at the point of service. The precise modalities regarding coverage or the of health services provided free of charge vary across countries. Such an approach has proven popular in parts of West Africa and Central Africa (Lépine, Lagarde, and Le Nestour, 2018; Olivier de Sardan and Ridde, 2012); Morocco is another example of a country that has chosen broad-based fee exemptions through its *RAMED* system, which is the subject of chapter 2.

What can account for the different strategies chosen by low and middle income countries to expand health coverage? Although a certain level of economic development as well as fiscal capacity appear to be a necessary precondition, political aspects are paramount, as noted by Savedoff et al. (2012). Therefore, before turning our attention to the Middle East and North Africa region, we review briefly the various social, economic and political factors that have been examined in the literature.

### **1.2.2 Social protection in health : historical and political perspectives**

In industrialized economies, the welfare state performs a varieties of functions. It contributes to the correction of market failures, reduces inequalities, and plays a role in macroeconomic stabilization (Barr, 1992). But how did this combination of social insurance, assistance and public provision that we call the welfare state come to be? What are the force that drive the construction of social systems? This line of questioning is interesting from the point of view of Middle Income Countries that find themselves in a “middle of the road” position, with a modicum of fiscal space but limited state capacity (Banerjee, Niehaus, and Suri, 2019). In this section, we briefly review the political science and economics literature on the determinant of social programs expansion.

Historical studies put a great emphasis on the democratic nature of the regime to

explain the expansion of social programs in 19th century Europe. Lindert (2014), in his history of social spending, argues that some social programs, in particular universal education and poor relief, could have been implemented much sooner than they have; in Great Britain, France, and the US, it is only after the electoral franchise was extended that the share of national income devoted to these areas began growing to significant amounts as a share of GDP<sup>1</sup>. Such a mechanism might be at play in contemporary developing countries. Carbone and Pellegata (2017), using data on leadership change in Africa since the early 1990s, find evidence that elected leadership, especially in the context of multi-party elections, leads to higher social spending. Kim (2007), using a historical data from 1880 to 1950 Europe, shows that the extension of the franchise, combined with the intensity of workers strike, correlates with the percentage of the population covered by social insurance. This result is interpreted as evidence in favor of the democratic determinant of social protection, via the “threat of revolution mechanism” put forward by Acemoglu and Robinson (2005).

The hypothesis that democratization is the driving force behind social protection is at odds with some historical examples where social programs were put in place by authoritarian regimes. The most prominent example is late 19th century Germany, where chancellor Bismarck put in place a far-reaching system of social insurances in order to co-opt the worker movement (Bärnighausen and Sauerborn, 2002). Another example of this kind of authoritarian leadership is the Singapore health care system, put in place by Prime Minister Lee Kuan Yew (Haseltine, 2013). Kim and Gandhi (2010) find evidence of such a mechanism of worker co-optation in a database of dictatorships covering the second half of the 20th century. One interesting finding is that the precise form of the social programs put in place by authoritarian regimes differs from the ones that proceed from democratic deliberation: based on a database of 140 countries since the end of the 19th century, Knutsen and Rasmussen (2018) find that while autocratic regimes are no less likely to put in place old-age pensions than democratic regimes, their systems have lower coverage and are more often targeted towards specific groups. Social programs can be used by autocratic regimes to redistribute rents to key support groups, as well as solve the “credible commitment to redistribution” problem (Acemoglu and Robinson, 2005).

A third explanation is that the welfare state is linked to the development of the market economy itself. According to Polanyi’s “double movement” hypothesis (Polanyi, 1944), the process of “commoditization” of goods that were previously embedded in social relations leads to a counter-movement that aims at removing those goods from the grip of the market. A modern variation on this theory is Rodrik (1998), who shows that there is

---

<sup>1</sup>This stylized view of history is consistent with the classical political economy view of Meltzer and Richard (1981), where a greater degree of inequality leads to increased redistribution through electoral competition.

a robust statistical association between one country's exposure to trade and capital flows on the one hand and the size of the government on the other hand. Rodrik's interpretation is that globalization, while increasing average incomes, also increases their dispersion, and constitutes a source of risk; in return, exposed workers demand an increased protection from their government. Note that this hypothesis is debated among global political economy scholars that often view globalization as a catalyst for a "race to the bottom" in social protections, particularly among developing countries (Meinhard and Potrafke, 2012; Rudra, 2002).

Beyond structural explanations, historical dynamics as well as cultural factors may play an important role in explaining why the welfare states of various countries look the way that they do. For many developing countries, the relation to European imperialism in the 19th century plays a big role. Schmitt (2015), based on data from 91 former British, French and Spanish colonies from 1820 to the present time, finds that the identity of the colonizing nation matters for the current form of the social protection system. In former British colonies, the introduction of work injury legislation was historically conditioned on the level of fiscal revenue, on the basis of the colonial ideology that colonies should be able to "pay for themselves". By contrast, in the French colonial empire, the introduction of social security provisions appeared simultaneously in all countries, probably reflecting the more "constructivist" view of the French. We revisit the issue of the colonial heritage in section 1.3.3.

More remote historical factors may matter as well. Kuran (2018) argues that the Arab conquest of the 7th and 8th century have had a lasting impact on trust in islamic societies, through the specific institutions of the *waqf* and the islamic rules of heritage, preventing the formation of impersonal institutions such as the modern corporation or social protection. Finally, Alesina, Glaeser, and Sacerdote (2001) argue that social and ethnic fragmentation can prevent the expansion of social protection. The fact that social transfers would statistically benefit more to group that are perceived as "other" renders those transfers unappealing to many voters.

Each of this explanations might have some degree of validity to explain the shape of social systems in the Middle East and North Africa region, and for Morocco. We now turn to an overview of the main economic and social characteristics of this region.

## 1.3 Morocco in the Middle East and North Africa region

Due to historical and cultural factors, the Middle East and North Africa region is often perceived as a geographical unity<sup>2</sup>. The shared experience of the 7th and 8th century Arab conquest has left a lasting cultural imprint, materialized by the use of the Arabic language and sunni Islam as a majority religion (Lewis, 2002).

There is indeed a degree of convergence in demography, education and labor markets across countries of the MENA region (Campante and Chor, 2012; Yousef, 2004), as well in the delivery of public goods and the organization of social systems (Alami, 2017). That the societies themselves perceive themselves as being part of the same cultural ensemble was demonstrated by the contagion of the “Arab spring” protests across countries in 2011 (Malik and Awadallah, 2013).

Yet cultural and linguistic unity does not imply homogeneity. Significant differences exist within the MENA region, the most structuring one being the opposition between oil-producing countries and others (Rauch and Kostyshak, 2009). But the countries also differ in the relation they had with European imperialism in the 19th century, and whether they have formally been part of the Ottoman Empire before that. The political regimes are diverse, going from military one-party states to constitutional monarchies (Richards and Waterbury, 2008).

The goal of this section is to position Morocco in its regional context, by highlighting similarities as well as factors that differentiate the country from its neighbors. We structure our discussion around two sections: while Morocco resembles the rest of the region with respect to demography, labor market, and education (1.3.1), its health outcomes as well as poverty and inequality indicators lie below the regional average (1.3.2). In subsection 1.3.3 we provide an overview of common characteristics of the social systems of MENA countries, as well as highlighting the singularity of the Moroccan case.

### 1.3.1 Similar dynamics with regards to demography, education, and the labor market

The countries of the Middle East and North Africa region have experienced similar demographic dynamics: they have urbanized rapidly, and are currently ending their de-

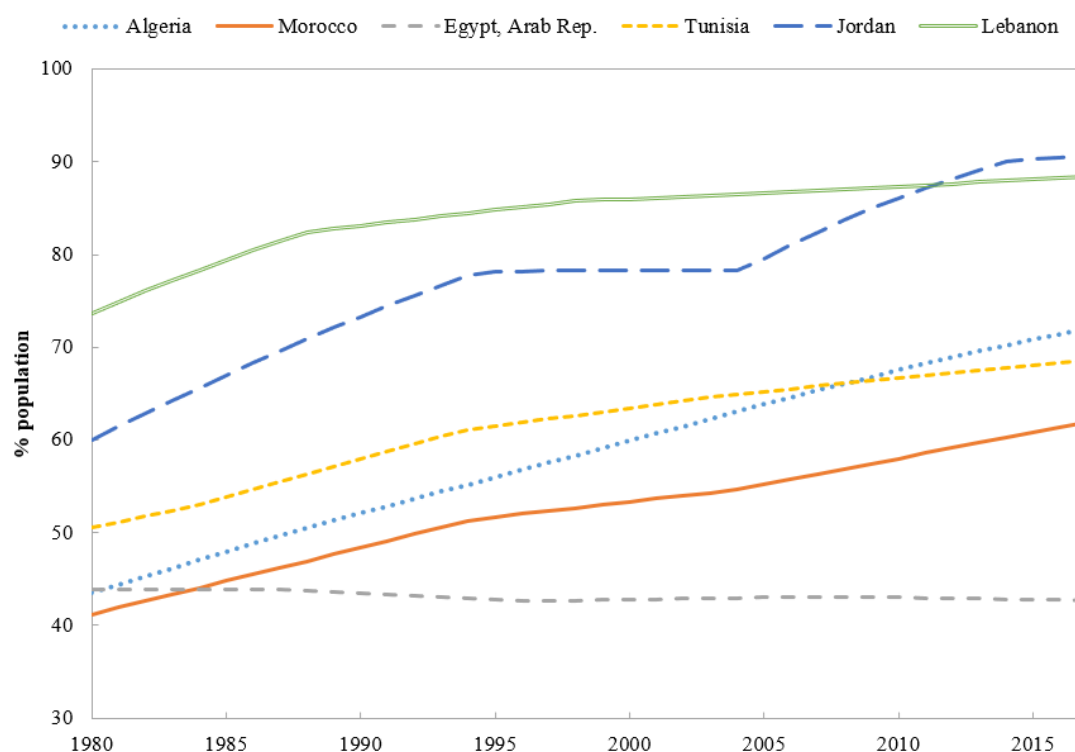
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<sup>2</sup>across this chapter, as well as in the rest of this thesis, “Middle-East and North Africa” is composed of the following countries: Morocco, Algeria, Tunisia, Libya, Egypt, Jordan, Lebanon, Syria, Palestinian territories, Iraq, Saudi Arabia, United Arab Emirates, Oman, Qatar, Bahrein, Kuwait; it excluded Iran, Turkey, Israel, Mauritania, Sudan, and Djibouti, that are sometimes included in the region). When necessary, we exclude either the ensemble of Gulf Countries or High-Income countries (i.e. Gulf countries minus Yemen and Oman)

mographic transition. Their populations are young, although concerns about aging are surfacing. All the countries in the region are plagued by high youth unemployment and low female labor force participation, and Morocco is no exception.

## Population and demography

**Figure 1.1** – Urbanization, 1980-2017



source: World Bank WDI

In the last 50 years, MENA countries have undergone a rapid urbanization (figure 1.1). However, together with Egypt, Morocco retains one of the highest share of the population living in rural areas: 38% as of 2017. While the urbanization rate was similar to Algeria at the beginning of the 1980s, at approximately 40%, today it lies 10 percentage points below its neighbor, and far below the levels reached in Jordan and Lebanon. This relatively high share of rural population has repercussion on access to health infrastructure (cf. part 1.3.2).

Table 1.2 contrasts demographic indicators in Morocco with the MENA averages. Morocco, and the MENA region, have low total fertility rates, at respectively 2.5 and 2.8 births per woman. This indicator has experienced a sharp fall during the 1980s and 1990s: in 1980, the average number of birth per woman was close to 6 (5.7 in Morocco, and 6.2 in the MENA region). The wanted fertility rate in Morocco is now below the

**Table 1.2** – Demography: selected indicators by groups of countries

|   | LIC  | MENA | MIC  | MAR               | year |
|---|------|------|------|-------------------|------|
| <i>fertility</i>  |      |      |      |                   |      |
| Fertility rate, total (births per woman)                  | 4.6  | 2.8  | 2.3  | 2.5               | 2016 |
| Wanted fertility rate (births per woman)                  | 4.3  |      |      | 1,8 <sup>a</sup>  | 2013 |
| Contraceptive prevalence, any methods (%)                 | 34.2 | 61.4 | 65.1 | 67,4 <sup>b</sup> | 2014 |
| Contraceptive prevalence, modern methods (%)              | 29.6 | 50.6 | 49.7 | 58,6 <sup>b</sup> | 2014 |
| <i>population structure by age</i>                        |      |      |      |                   |      |
| Age dependency ratio (% of working-age population)        | 84.5 | 58.2 | 50.7 | 51.9              | 2017 |
| Age dependency ratio, old (% of working-age population)   | 6.2  | 8.1  | 11.1 | 10.3              | 2017 |
| Age dependency ratio, young (% of working-age population) | 77.2 | 49.2 | 38.7 | 41.6              | 2017 |
| Population ages 0-14 (% of total)                         | 42.1 | 31.3 | 25.8 | 27.4              | 2017 |
| Population ages 15-64 (% of total)                        | 54.5 | 63.6 | 66.7 | 65.8              | 2017 |
| Population ages 65 and above (% of total)                 | 3.4  | 5.1  | 7.4  | 6.8               | 2017 |

Source: World Bank WDI.

LIC: Low Income Countries; MENA : Middle East and North Africa (excl. high income); MIC : Middle Income Countries; MOR : Morocco <sup>a</sup> year: 2004 <sup>b</sup> year: 2011

natural replacement rate, at 1.8 child per woman. Modern contraceptive use is high in comparison to middle and low income countries: 58.6% of women use them, compared to 49.7% in middle income countries. As always, these country averages mask important differences between urban and rural areas.

The decline in fertility reflects profound changes that the societies of the southern border of the Mediterranean have undergone in the past 30 years, such as the postponement of the average age at the first marriage, and increase in divorce rates (Bouharbat and Ajbilou, 2007). Economic determinants, such as the high youth unemployment, are of course part of the phenomenon; the entry into adult life, defined by the formation of a household of one's own, is complicated by lack of access to quality jobs and housing (1.3.1)

MENA countries have completed their demographic transition, with low mortality and fertility rates. This translates in a population structure that is characterized by a high share of working-age individuals and low dependency ratios (cf. appendix figure 1.A.2). However, in Morocco, the share of the elderly in the population has already started to increase (from 5% in 2000 to 6.8% today), and the dependency ratio is predicted to rise in the next 20 years (Bertho et al., 2017). Moreover, high unemployment rates for the youth and low female labor force participation imply that the region is not enjoying the benefits of the demographic dividend to its full extent (Dhillon and Yousef, 2011).

## Labor Market

Everywhere in the MENA region, the labor market is characterized by the exclusion of the youth and low female labor force participation. In Morocco and the MENA region, female labor force participation rate are respectively of 26.8 and 20 % of the working age population; by contrast, across middle-income countries, the average rate is 50% (1.3). In the region, youth unemployment represents lies at 27% of the labor force, against 14% in middle income countries. In Morocco, the youth unemployment rate is slightly lower, at 18%; youth unemployment has come down since the peak of the 1990s, when it stood upwards of than 25%, but it has been stagnating at current levels since the mid-2000s (see figure 1.A.3 in the appendix).

**Youth unemployment** The unemployment estimates of the ILO do not provide an accurate picture of the extent of youth exclusion. The distinction between “unemployed” and “inactive” is fuzzy, due to the absence of formal unemployment insurance mechanisms. For instance, in Morocco, there is more movement between employment and inactivity than there is between employment and unemployment (Verme et al., 2016). Statistics on the precise numbers of young not in employment, education or training (NEET) are hard to come by, but separate studies suggest that they are at least as numerous as the unemployed (Banque Mondiale, 2012).

High youth unemployment has persisted despite rising education levels. In Morocco, post-secondary education has increased quickly over the past 16 years, reaching 30% of the relevant age group in 2015 (cf. figure 1.A.5 in appendix). The gap between men and women in tertiary education has disappeared and more women than men graduate from university each year (Bougroum and Ibourk, 2011). Primary education, which had long been lagging behind, was the object of large public investments in the 2000s; primary education is now universal, even in remote rural areas. Yet the literacy remains low in international comparison (table 1.4), as do the enrollment rate in secondary education (see figure 1.A.4 in appendix).

Although young university graduates have the highest unemployment rates in the population, this does not imply that the higher-educated are the most disadvantaged on the labor market (Banque Mondiale et HCP, 2017; El Aynaoui and Ibourk, 2018). It is not clear to what extent this high unemployment of graduates is attributable to a lack of labor demand, due for instance to insufficient competition in goods and services markets or to rigid hiring and firing rules (Agénor and El Aynaoui, 2005; Tzannatos, Diwan, and Ahad, 2016), and to what extent they are attributable to supply-side factors, such as the mismatch between skills acquired in training and those demanded on the labor market, or to queuing for public sector jobs (Chauffour, 2012).



**Table 1.3** – Labor market indicators, by groups of countries

|  | LIC  | MENA | MIC  | MOR  | year |
|--|------|------|------|------|------|
| Labor force participation, female (% of pop. 15-64)      | 66.6 | 20.0 | 50.0 | 26.8 | 2017 |
| Labor force participation, male (% of pop. 15-64)        | 81.3 | 75.7 | 80.7 | 78.8 | 2017 |
| Labor force, female (% of labor force)                   | 45.5 | 20.6 | 37.4 | 26.1 | 2017 |
| Employment to population ratio, 15+, female (%)          | 60.7 | 16.8 | 43.3 | 22.5 | 2017 |
| Employment to population ratio, 15+, male (%)            | 76.1 | 67.9 | 72.5 | 67.4 | 2017 |
| Employment to population ratio, 15+, total (%)           | 68.3 | 43.4 | 58.0 | 44.4 | 2017 |
| Unemployment, total (% of labor force)                   | 5.7  | 11.9 | 5.4  | 9.3  | 2017 |
| Youth unemployment, total (% of labor force 15-24)       | 10.9 | 27.0 | 13.7 | 18.0 | 2017 |
| Self-employed, total (% of total employment)             | 77.1 | 31.5 | 49.6 | 53.7 | 2017 |
| Vulnerable employment, total (% of total employment)     | 75.0 | 26.2 | 46.5 | 50.7 | 2017 |
| Wage and salaried workers, total (% of total employment) | 22.9 | 68.5 | 50.4 | 46.3 | 2017 |

Source: modeled ILO estimates, World Bank WDI. LIC: Low Income Countries; MENA : Middle East and North Africa ; MIC : Middle Income Countries; MOR : Morocco

**Table 1.4** – Literacy rates, by groups of countries

|  | LIC  | MEA  | MIC  | MOR               | year |
|--|------|------|------|-------------------|------|
| Literacy rate, adult female (% of females ages 15 and above) | 52.8 | 72.6 | 81.6 | 59.1 <sup>a</sup> | 2016 |
| Literacy rate, adult male (% of males ages 15 and above)     | 68.6 | 86.2 | 89.6 | 80.4 <sup>a</sup> | 2016 |
| Literacy rate, adult total (% of people ages 15 and above)   | 60.6 | 79.6 | 85.6 | 69.4 <sup>a</sup> | 2016 |
| Literacy rate, youth female (% of females ages 15-24)        | 69.2 | 88.5 | 91.5 | 87.8 <sup>a</sup> | 2016 |
| Literacy rate, youth male (% of males ages 15-24)            | 76.6 | 93.0 | 94.0 | 94.6 <sup>a</sup> | 2016 |
| Literacy rate, youth total (% of people ages 15-24)          | 72.9 | 90.8 | 92.8 | 91.2 <sup>a</sup> | 2016 |

Source: World Bank WDI. LIC: Low Income Countries; MENA : Middle East and North Africa ; MIC : Middle Income Countries; MOR : Morocco <sup>a</sup> year: 2012

The first of these explanation refers to the fact that a high percentage of high school graduates are oriented towards non-technical studies in university (Bougroum and Ibourk, 2011), a tendency aggravated in the case of Morocco by the linguistic policy<sup>3</sup>. The second explanation holds that young graduates unemployment principally reflects queuing phenomena for public sector jobs. The difference in amenities between the public and the private sector is such that a lot of university graduates prefer public sector employment, event at the price of a steep discount on their wages (Banque Mondiale, 2012). Anecdotal evidence for this phenomenon can be found in the fact that an organized movements of the “unemployed university graduates” (*diplômés chômeurs*) exists, that lobbies since the end of the 1980s for direct recruitment in the administration (Emperador Badimon, 2011).

**Low female labor force participation** The other common characteristic of Middle East and North African societies is the low level of female employment, which compares

<sup>3</sup>While the teaching in public schools is done in Arabic, at university level the system switches to French, except in some specific subjects such as Law, Literature or Islamic studies

negatively to countries with similar level of economic development outside of the region. Female employment has remained flat over the past three decades, despite rising education levels and falling fertility. As noted by Karshenas, Moghadam, and Alami (2014), the lack of women on the labor market comes mainly from the middle of the skills and education distribution. While employment rates are (relatively) high at graduate level as well as for uneducated women, women in MENA countries are less present in mid-level positions and occupations.

Given that no obvious economic feature seems to account for low female labor force participation levels, one widespread view is widespread that this is due to cultural factors, in particular strict gender roles in patriarchal societies, where the woman is predominantly seen as the “keeper of the household”, and a “wife and mother” first. Using the World Values Survey polls, Diwan, Tzannatos, and Akin (2018) find that respondent from Arab World countries have indeed low levels of acceptance of the women’s work outside home. There is also ample qualitative evidence on this issue (see for instance Mernissi 1987 or Lecestre-Rollier 2015).

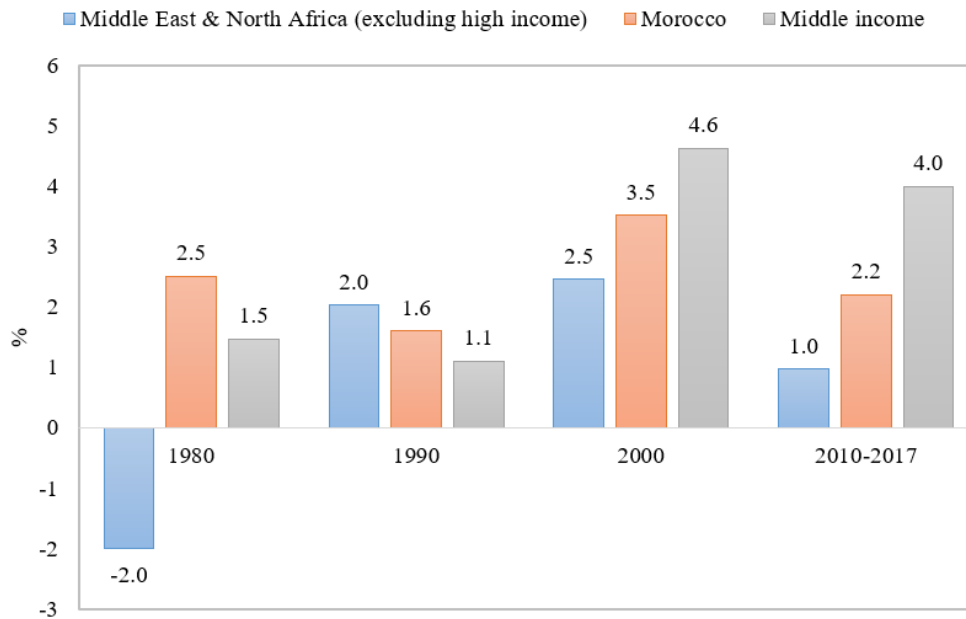
However, cultural explanations are hard to reconcile with the some stylized facts. For instance, if Middle Eastern and Northern African societies appear at outliers *now*, it wasn’t always the case. Karshenas, Moghadam, and Alami (2014) show that, in 1980, the female labor force participation was in line with the average in middle income countries, suggesting that specific path-dependencies may be at play (Gaddis and Klasen, 2014).

### **1.3.2 Lower outcomes in health and poverty**

#### **High poverty and inequality despite recent growth**

Morocco’s economy, devoid of significant amounts of natural resources, is more dependent on the primary sector than other countries in the region; annual growth rates are still very much correlated with agricultural growth (Vergne, 2014). In the 1990s, average growth was slow, due to the after-effect of the structural adjustment plan that Morocco had to undertake in the late 1980s. Following an economic liberalization of the economy in the mid-1990s, growth picked up in the 2000s, reaching an 3.52% per year over the decade (figure 1.2), behind the average of middle income countries (4.6%), but higher than in the MENA region. GDP growth has slowed down since 2010, to 2.2% per year on average, against 4% in middle income countries (although this rate is still higher than the regional average of 1%).

In Morocco, the economic growth of the past two decades has been accompanied by significant poverty reduction (figure 1.A.1 in appendix). Extreme poverty, measured by the \$ 1.90 a day line (in 2011 USD PPP) has reached insignificant levels (1% of the

**Figure 1.2** – Average per capita GDP growth, by sub-period

source: World Bank, WDI database.

population in 2013). Absolute poverty, at the \$3.20 a day line, has been divided almost fourfold in the space of 15 years (from 28.2% of the population to 7.7% in 2013).

This does not mean that the problem of poverty has been “solved” in the Kingdom<sup>4</sup>. In 2013, 31.3% of the population lived below the \$5.50 a day line that marks the beginning of a “global middle class” (Banerjee and Duflo, 2008). Among the countries in the region, Morocco has one of the higher poverty rates (together with Egypt, cf. table 1.5), when measured at international lines. But at the national poverty line, Morocco has the lowest poverty headcount of the region, at 4.2% of the population. This is indicative of the low level at which the national poverty line is set, close to the extreme poverty line<sup>5</sup>. Besides the regular reevaluation to take into account increases in the price index, the poverty line has not been updated since the 1980s (ONDH, 2016c).

Finally, inequalities are higher in Morocco than in the rest of the region: the consumption-based Gini index lies at 39.5 (table 1.5). One of the drivers of this high level of inequality is the difference in living standards between the cities and the countryside. These urban-rural differentials are apparent in the poverty headcount: the poverty rate is of 8.9% in rural areas, against 1.1% in cities (at national poverty lines), again one of the biggest relative differentials in the region.

<sup>4</sup>Although the official discourse occasionally comes close to affirming so cf. HCP (2015), p.11

<sup>5</sup>In 2014, the national poverty line was set at 12DH a day, corresponding to 1.1 EUR, or 2.4 PPP USD (ONDH, 2016c)

**Table 1.5** – absolute poverty rates at World Bank lines, by country

|         | <b>\$1.90 a day</b> | <b>\$3.20 a day</b> | <b>\$5.50 a day</b> | <b>national poverty line</b> |                   |                   | <b>GINI</b>       | <b>year</b> |
|---------|---------------------|---------------------|---------------------|------------------------------|-------------------|-------------------|-------------------|-------------|
|         | <i>national</i>     | <i>national</i>     | <i>national</i>     | <i>national</i>              | <i>rural</i>      | <i>urban</i>      | <i>national</i>   |             |
| Algeria | 0.5                 | 3.9                 | 29.2                | 5.5                          | 4.8               | 5.8               | 27.6              | 2011        |
| Egypt   | 2.3                 | 22.7                | 70.3                | 25.2 <sup>a</sup>            | 32.3 <sup>a</sup> | 15.3 <sup>a</sup> | 31.8 <sup>b</sup> | 2012        |
| Jordan  | 0.1                 | 2.1                 | 18.1                | 14.4                         | 16.8              | 13.9              | 33.7              | 2010        |
| Lebanon | 0                   | 0.1                 | 1.9                 | 27.4 <sup>c</sup>            |                   |                   | 31.8              | 2011        |
| Morocco | 1                   | 7.7                 | 31.3                | 4.2 <sup>d</sup>             | 8.9 <sup>d</sup>  | 1.1 <sup>d</sup>  | 39.5              | 2013        |
| Tunisia | 0.3                 | 3.2                 | 18.3                | 15.2                         |                   |                   | 32.8              | 2015        |

Source: World Bank WDI. Poverty lines expressed in 2011 PPP USD.

last year available for each country. <sup>a</sup> year: 2010 <sup>b</sup> year: 2015 <sup>c</sup> year: 2012 <sup>d</sup> source: HCP

## Health and healthcare

With the exception of life expectancy, Morocco's performance in increasing the health of its inhabitants lags behind other countries in the region (figure 1.6). The maternal mortality ratio is 50% higher than MENA average (121 per 100,000 live birth, against 81 in the MENA region). Neo-natal and under-five mortality rates are also slightly higher than the regional average, reflecting the lower percentage of birth attended by skilled health staff (73.6% in Morocco against 85.6% in the region).

This can be linked to lower levels of spending in health care, and higher reliance on private financing (figure 1.7). At 5.5% of GDP, Morocco's overall spending on health care is below the average for MENA country (5.8% of GDP); expressed in terms of PPP USD per capita, it also lies below the average of middle-income countries (435 USD PPP per capita against an average of 560 USD PPP per capita in middle income countries). Public expenditure on health care is particularly low : 189 PPP USD per person and per year in 2015, against 284 PPP USD in middle income countries and 351 PPP USD in MENA countries.

These figures are national averages that mask regional differences. Public health care spending by inhabitant varies by a factor of 5 according to the region: from 128 DH per inhabitant in the northern region of Taza-Al Hoceima to 640 DH per inhabitant in the southern region of Laâyoune-Sakia el Hamra (cf. figure 1.A.6 in this chapter's appendix).

### 1.3.3 Social protection in Morocco and the MENA region

#### From a conservative-authoritarian model to residual anti-poverty programs

Karshenas, Moghadam, and Alami (2014) describe the social system of MENA countries as following a *conservative-authoritarian* model. Similarly to the “Bismarckian” welfare states of Continental Europe, they are corporatist and family-oriented. But in difference to their European counterparts, they are governed in a top-down manner, without involve-

**Table 1.6** – Indicators of health outcomes, by groups of countries

|   | LIC  | MENA | MIC  | MOR   | year |
|---|------|------|------|-------|------|
| Life expectancy at birth, total (years)                 | 62.5 | 73.3 | 71.1 | 75.6  | 2017 |
| Maternal mortality ratio (per 100,000 live births)      | 479  | 81   | 180  | 121   | 2017 |
| Infant mortality rate (per 1,000 live births)           | 48.6 | 19.3 | 27.8 | 20    | 2017 |
| Neonatal mortality rate (per 1,000 live births)         | 26.4 | 12.7 | 17.9 | 14.4  | 2017 |
| under-5 mortality rate (per 1,000 live births)          | 69.1 | 23.1 | 36.2 | 23.3  | 2017 |
| Births attended by skilled health staff (% of total)    | 58.6 | 85.9 | 82.9 | 73.6a | 2014 |
| Immunization, measles (% of children ages 12-23 months) | 74.3 | 86.6 | 85.9 | 99.0  | 2017 |
| Prevalence of stunting (% of children under 5)          | 36.5 | 15.8 | 23.6 | 14.9a | 2017 |
| Prevalence of wasting (% of children under 5)           | 7.4  | 7.6  | 8    | 2.3a  | 2017 |
| Prevalence of severe wasting (% of children under 5)    | 2    | 3.2  | 2.7  | 1a    | 2017 |

Source: all data from World Bank WDI. LIC: Low Income Countries; MENA : Middle East and North Africa; MIC : Middle Income Countries; MOR : Morocco <sup>a</sup> year 2011

**Table 1.7** – Indicators of health spending, by groups of countries

|  | LIC   | MENA  | MIC   | MAR   | year |
|--|-------|-------|-------|-------|------|
| Physicians (per 1,000 people)                            | 0.31  | 1.12  | 1.28  | 0.62a | 2013 |
| Hospital beds (per 1,000 people)                         | 1.21b | 1.23  | 2.38  | 0.90  | 2011 |
| Current health expenditure (% of GDP)                    | 6.1   | 5.8   | 5.4   | 5.5   | 2015 |
| Current health expenditure per capita, PPP \$            | 98    | 724   | 560   | 435   | 2015 |
| General government health expenditure per capita, PPP \$ | 19.8  | 351.1 | 284.2 | 188.5 | 2015 |
| General government health expenditure (% of CHE)         | 19.6  | 47.7  | 52.6  | 43.3  | 2015 |
| General government health expenditure (% of GDP)         | 1.2   | 2.8   | 2.8   | 2.4   | 2015 |
| General government health expenditure (% of GGE)         |       | 9.4c  |       | 7.7   | 2015 |
| Private health expenditure (% of CHE)                    | 50.6  | 51.7  | 46.5  | 55.7  | 2015 |
| Private health expenditure per capita (current US\$)     | 18.8  | 118.6 | 119.5 | 89.0  | 2015 |
| Private health expenditure per capita, PPP \$            | 49.7  | 369.3 | 269.6 | 242.5 | 2015 |
| Out-of-pocket expenditure (% of CHE)                     | 44.2  | 46.0  | 36.5  | 53.1  | 2015 |

Source: all data from World Bank WDI. LIC: Low Income Countries; MENA : Middle East and North Africa (excl. High income); MIC : Middle Income Countries; MOR : Morocco

CHE: Current Health Expenditures; GGE : Government General Expenditures <sup>a</sup> year 2011

<sup>b</sup> year 2006 <sup>c</sup> year 2009

ment of organized labor. Their creation in the post-independence period of was tightly linked to the process of state-building, with the secondary objective of creating a social support base (Richards and Waterbury, 2008). These systems provided free schooling, healthcare, subsidized staples and public utilities, as well as pension plans and (often) housing subsidies for government employees, financed mainly by general government revenue (often dominated by natural resource rents). Although not formally part of the social system, the policy of guaranteed employment for university graduates was also perceived as being an integral part of the “social pact” that characterized post-independence, modernizing MENA states.

This relatively generous package of benefits was not universal; its coverage was limited to (mostly male) employees of the public sector. The self-employed, domestic workers, informal as well as agricultural workers were *de facto* excluded. The financing of these regimes appeared unsustainable in the 1980s, when the majority of the middle-income MENA countries experienced public budget or balance-of-payment imbalances that led to macroeconomic reforms, in the form of reduced public expenditure and opening of markets (Yousef, 2004). One of the main victims of this period of macroeconomic adjustment period is the policy of guaranteed recruitment for university graduates.

The return to economic growth of the 2000s did not lead to an expansion of the old-style social programs. In its stead, countries put in place various anti-poverty programs (World Bank, 2011). While possibly poverty-reducing, they may also lead to an increasing fragmentation of social systems; and in practice, they are often quite small (Alami, 2017). In chapter 2, we study one of such programs, the RAMED system of free hospital care, that was put in place in 2012 in Morocco.

In any case, this renewed focus on poverty alleviation was not enough to prevent the social grievances that led to the Arab spring revolts. Nor, crucially, were they sufficient to warrant the suppression of food and fuel subsidies that constitute a significant drag on public finances, especially for non-oil-producing countries. These represented an average of 7.1 of GDP in 2009 across MENA countries, and close to one third of government expenditure in Morocco in 2012, at the height of the oil price spike (Ministère des Finances, 2014).

### **The legacy of colonialism in Morocco**

As in the political domain (Hibou, 2006), the legacy of colonial rule has left a lasting imprint on the organization of the healthcare system in Morocco. We briefly outline some characteristics of Morocco’s experience of colonialism that may contribute to an understanding of the issues it faces today.

From 1912 until its independence in 1956, Morocco was divided between France (for

the central part) and Spain, which controlled the northern part of the country as well as the *Rio de Oro* in the south. Under French rule, the country remained nominally ruled by the Sultan (which would take on the title of King, or *malik*, after the Independence) but the modern administration was under the control of the powerful of the *Residence Générale* (Rivet, 2012).

As documented by Cogneau, Dupraz, and Mesplé-Somps (2018), the colonial rule in North Africa was characterized by a high degree of fiscal extraction and expenditures oriented towards “production support”, e.g. subsidies to French firms, roads, communications, mining or agricultural research. In matters pertaining to health and education, the level of spending where both relatively low, and skewed towards settlers (as well as a small Moroccan elite). In 1925, across North Africa, public expenditure on education represented on average 9.1% of total government expenditures (to be compared with 20.3% in French mainland territory); accordingly, gross primary enrolment for autochthons was of 4.1% only (Cogneau, Dupraz, and Mesplé-Somps, 2018, p. 29). Health and health care represented 6.7% of total public expenditure, a number actually higher than the one for mainland France (5.9%), where national health insurance didn’t yet exist; but the number of health professionals was far lower, at 0.31 per 1000 inhabitants (against 1.4 in France).

Two points are worth mentioning regarding public expenditure towards human capital in North Africa during the colonial period. First, while both the outlays and the indicator are far behind those for France, they are significantly above the rest of the colonial empire, reflecting the character of the three North African countries as colonies of settlement, as opposed to the extractive nature of other parts of the colonial empire (Indochina, Madagascar, and French West Africa).

Second, in the period between the end of World War II and the Independence of the various countries<sup>6</sup>, public expenditure increased markedly, as a way to counter demands for self-determination. The pre-independence period is also the only time interval where the countries of French North Africa received significant amounts of their revenue from foreign assistance; in previous periods, colonial expenditure was supposed to be financed entirely from colonial fiscal revenue, without external injection (Cogneau, Dupraz, and Mesplé-Somps, 2018).

Particularly relevant for our purposes is the great continuity between the pre- and post-independence in fiscal matters: there is no break in the time series of the amount of tax revenue and external help. This continuity can also be found in the organization of the public health care sector. In Morocco, as in numerous other countries (cf. Mathonnat, 2009), public health care is organized in a pyramidal way, with great importance given to

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<sup>6</sup>1956 for Morocco and Tunisia, and 1962 for Algeria

a small number of big, specialist hospitals and a relative neglect of primary care. Some other aspects of the health care system, such as the exemption of user fees for the so called *indigents* (i.e. people notoriously too poor to pay the user fees in public hospitals) are also direct remnants of the colonial era, although at the time there was in addition a segregation between “european hospitals”, which were not opened for Moroccans except a tiny elite, and the so-called *hopitaux indigènes*, of much lower quality (Ministère de la Santé, 2015b).

## 1.4 Why a thesis on health and poverty in Morocco?

The choice of writing a dissertation entirely on one country, using a single database, deserves some justification. This choice was motivated principally by a personal trajectory, but also by a perception of a real gap in existing research. The form that this work ended up taking differs somewhat from what was initially envisioned, which is attributable to constraints encountered during the research process. Although these factors are not, *per se*, relevant to the scientific appreciation of this dissertation, I mention them here for the sake of comprehension of the global process leading to this work.

I start by describing the personal path that led me to Morocco, as well as the personal reasons for undertaking a research work on this country (section 1.4.1). Section 1.4.2 discusses the lack of applied microeconomic research on health and poverty in the MENA region, and in Morocco in particular, which represented both an opportunity to make a positive contribution, and at the same time constituted a major obstacle, in the form of a difficult access to data sources. Section 1.4.3 briefly explains how I dealt with this obstacle, and how they conditioned the format and content of this thesis.

### 1.4.1 The outcome of a personal journey

I first set foot in Rabat in February 2011. I had just graduated from university, and was starting a two-year contract with the Delegation of the French Treasury in Morocco, located within the French Embassy, as a macroeconomic and country-risk analyst. I ended up spending three years and a half in Rabat, more than I originally anticipated, first at the Embassy and then as a teaching associate at the Moroccan School for Governance and Economics, a semi-private university.

The years 2011 to 2013 were an interesting period to work at the French Embassy in Morocco<sup>7</sup>. The whole region was in the middle of the popular uprising of the Arab

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<sup>7</sup>although in this case, “interesting” reminds of the - apocryphal - curse used by ancient Chinese civil



Spring, and Morocco was no exception, although the process had a much more peaceful outcome than in other countries. Moreover, the country was experiencing severe macroeconomic headwinds, in the form of the Eurozone crisis that impacted negatively its exports, FDI inflows, tourism and remittances receipts. On top of that, international oil prices were at an all-time high, which put Morocco's balance of payments as well as public finances under severe strain: since interior prices were effectively insulated from international prices through the *caisse de compensation* mechanism, an increase in international prices was immediately reflected in higher public expenditures on oil subsidies. Following protests, Morocco embarked on a process of constitutional revision in a more democratic direction, as well as in a political transition, letting the moderate Islamist party Justice and Development (*'adala wal tanmiya*) constitute a governmental coalition for the first time in history. One had the feeling that things were changing.

My experience in teaching, first as a part-time adjunct besides my work at the Embassy, then as full time teaching associate for a bit more than a year, had motivated my desire to go back to university to undertake a doctorate in Economics. In general, I wanted to do research in applied microeconomics. My master's econometrics project had given me a taste of working with household data, and the lecture I had followed in development microeconomics had produced on me the effect of a revelation, thanks to its ability to explain seemingly "irrational" behavior through the interplay of material constraints and market failures faced by households.

Moreover, it seemed to me that undertaking such a research work on the case of Morocco was natural, from the point of view of research ethics. It appeared to me somewhat inappropriate to write about a country one had never set foot in, and although my knowledge of Moroccan society was still very superficial, it appeared to me that I would be less illegitimate than other in writing on a country in which I had lived for some time, and in which I had friends and colleagues.

Writing on Morocco also seemed to me, somewhat immodestly, to make a positive contribution, as there was very little applied microeconomic research available on this country. In the next section, I examine this dearth of research in more detail, and tease out possible explanations for this state of affairs.

## **1.4.2 The lack of applied microeconomic research on Morocco**

We have noted in part 1.3.2 that the allocation of public funds to health care in Morocco seemed to reflect a lack of prioritization of domains linked to human capital development.

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servants: "may you live in interesting times".

Another indicator of the relatively secondary status given to health and education is the dearth of applied microeconomic research on these topics.

Figure 1.3 summarizes the results of a search on the *Econlit* database for academic publications containing “Morocco” either in the title of the article or in the abstract, over the period from 1990 to today. For comparison, we show the results of the same search for three other lower middle-income countries of approximately same population levels: Cameroon, Sri Lanka, and Peru. Without imposing any criteria for exclusion, Morocco counts fewer publications than Sri Lanka and Peru (656 against respectively 786 and 1153 respectively), but more than Cameroon (475). When restricting our search to articles that do not deal with macroeconomic or trade-related issues (middle panel of figure 1.3), Morocco is lagging behind the three other countries 274 publication against 386 for Cameroon, 511 for Sri Lanka, and 850 for Peru. The biased orientation of economic research towards Macroeconomics and Trade is also apparent when looking at the detail of published articles (table 1.8). In the three other countries, the first category of publication is the same : “economic development: human resources; human development; income distribution; migration”. In Morocco, this category comes third. In contrast, the published research on Morocco seem to be much more concentrated on Macroeconomic, financial, and trade-related issues. Out of the 882 publications related to the top 10 subjects mentioned, 62% are related to trade, macro, and financial issues in Morocco. This proportion is 59% in Sri Lanka, 33% in Peru, and 27% in Cameroon.

Why this focus of the academic research dealing with Morocco on trade and macroeconomic issues? One factor might be the presence of institutional idiosyncrasies and path dependencies in university research. A more likely explanation, in our view, is the lack of access to representative household-level datasets. Until very recently<sup>8</sup>, there was no publicly available household dataset, besides the various Demographic and Health surveys. The LSMS page of the World Bank group<sup>9</sup> shows only one such study, dating from the year 1991, and not available for download.

Note that this dearth of micro data is not due to the lack of statistical capacity. On the World Bank’s Statistical Capacity Indicator, Morocco has an overall score of 73 (out of 100), a level corresponding to the one of Poland, and in excess of the mean of Middle East and North Africa countries (mean: 60) (World Bank, 2018b). The national statistical body, the *Haut Commissariat au Plan* (High Commissariat for Planning), does not release microdata, nor does it give access to researchers. Indeed, even statisticians at the national High Commissariat are not given access to data beyond their division, and are, as a general rule, not allowed to publish research in external publications. This gen-

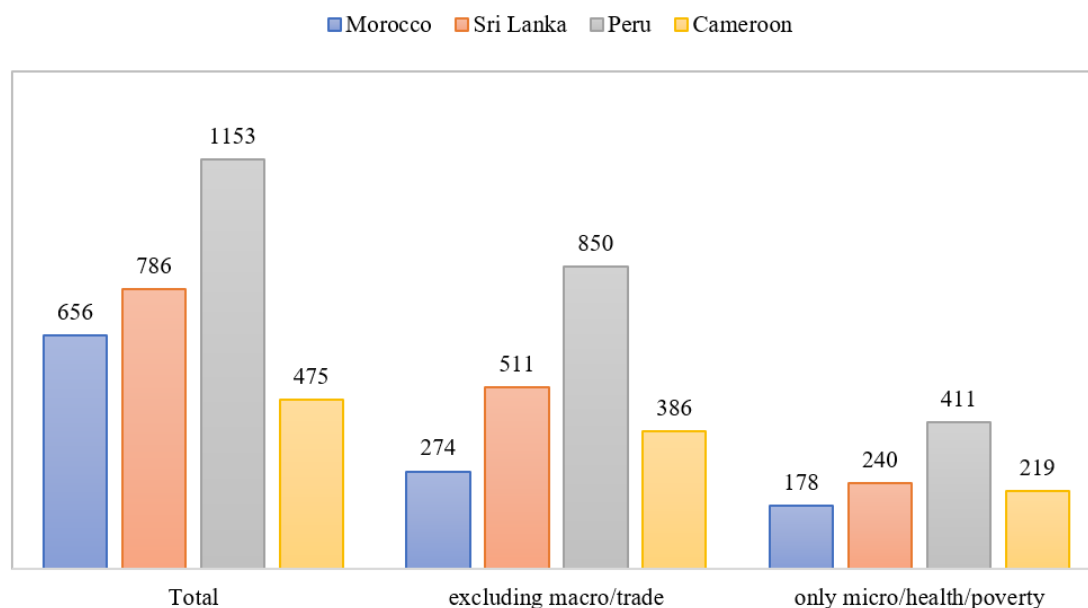
<sup>8</sup>the Household and Youth survey, conducted in 2009-10, was released in 2013 on the World Bank microdata portal

<sup>9</sup><http://iresearch.worldbank.org/lsms/lsmssurveyFinder.htm>

Table 18 – Academic publications: 10 most frequent subjects, by country

|   | Morocco      |   | Sri Lanka    |   | Peru         |   | Cameroon     |  |
|---|--------------|---|--------------|---|--------------|---|--------------|--|
| subject   | N            | subject   | N            | subject   | N            | subject   | N            |  |
| <i>international linkages to development; role of international organizations</i>                               | 150          | economic development; human resources; human development; income distribution; migration                        | 189          | economic development; human resources; human development; income distribution; migration                        | 336          | economic development; human resources; human development; income distribution; migration                        | 164          |  |
| <i>economic development; financial markets; saving and capital investment; corporate finance and governance</i> | 144          | <i>international linkages to development; role of international organizations</i>                               | 184          | economic development; agriculture; natural resources; energy; environment; other primary products               | 202          | economic development; agriculture; natural resources; energy; environment; other primary products               | 155          |  |
| economic development; human resources; human development; income distribution; migration                        | 128          | <i>economic development; financial markets; saving and capital investment; corporate finance and governance</i> | 139          | formal and informal sectors; shadow economy; institutional arrangements   | 159          | economic development; urban, rural, regional, and transportation analysis; housing; infrastructure              | 60           |  |
| economic development; agriculture; natural resources; energy; environment; other primary products               | 103          | economic development; agriculture; natural resources; energy; environment; other primary products               | 119          | <i>economic development; financial markets; saving and capital investment; corporate finance and governance</i> | 151          | <i>economic development; financial markets; saving and capital investment; corporate finance and governance</i> | 57           |  |
| <i>empirical studies of trade</i>   | 73           | <i>macroeconomic analyses of economic development</i>   | 111          | <i>international linkages to development; role of international organizations</i>                               | 145          | formal and informal sectors; shadow economy; institutional arrangements   | 55           |  |
| <i>industrialization; manufacturing and service industries; choice of technology</i>                            | 68           | formal and informal sectors; shadow economy; institutional arrangements   | 99           | economic development; urban, rural, regional, and transportation analysis; housing; infrastructure              | 122          | <i>international linkages to development; role of international organizations</i>                               | 55           |  |
| <i>macroeconomic analyses of economic development</i>   | 66           | <i>empirical studies of economic growth; aggregate productivity; cross-country output convergence</i>           | 85           | <i>macroeconomic analyses of economic development</i>   | 103          | renewable resources and conservation; forestry  | 47           |  |
| formal and informal sectors; shadow economy; institutional arrangements   | 57           | <i>industrialization; manufacturing and service industries; choice of technology</i>                            | 79           | <i>empirical studies of trade</i>   | 76           | <i>industrialization; manufacturing and service industries; choice of technology</i>                            | 42           |  |
| economic development; urban, rural, regional, and transportation analysis; housing; infrastructure              | 47           | <i>empirical studies of trade</i>   | 74           | measurement and analysis of poverty   | 75           | economics of gender; non-labor discrimination   | 37           |  |
| <i>empirical studies of economic growth; aggregate productivity; cross-country output convergence</i>           | 46           | economic development; urban, rural, regional, and transportation analysis; housing; infrastructure              | 62           | fertility; family planning; child care; children; youth   | 73           | <i>macroeconomic analyses of economic development</i>   | 35           |  |
| <b>total (N)</b>  | <b>882</b>   |   | <b>1141</b>  |   | <b>1442</b>  |   | <b>707</b>   |  |
| <b>macro/trade/finance (N)</b>  | <b>547</b>   |   | <b>672</b>   |   | <b>475</b>   |   | <b>189</b>   |  |
| <b>macro/trade/finance (%)</b>  | <b>62.0%</b> |   | <b>58.9%</b> |   | <b>32.9%</b> |   | <b>26.7%</b> |  |

Source: Econlit, search restricted to academic journals between the years 1990 and 2018. macroeconomic, finance, and trade-related subjects are marked in red

**Figure 1.3** – Number of publications, by country and themes, 1990-2018

Source: Econlit, author computation. Search restricted to articles published in Academic journals from 1990 to 2018, with country name in title or abstract. See appendix, table 1.B.1 for the list of keywords used to delimit categories.

eral “locking” of microdata, especially data related to human capital, is to our eyes the main explanation for the relative lack of knowledge on health issues and their relation to poverty.

While the lack of applied microeconomic research in Morocco could be perceived as an opportunity to produce new research findings, it turns out that the lack of access to microdata would prove a major barrier, that took me some time to overcome. In the final section of this part, I summarize the process through which I came to work with ONDH (*Observatoire National du Développement Humain*, or National Observatory for Human Development), from which the data used in this thesis originates.

### 1.4.3 Obstacles and their resolution

My initial plans for the thesis was to work both on labor market issues, using the Labor Force Surveys as well as the different waves of the National Informal Sector survey (*Enquête Nationale sur l'Emploi Informel*) collected by the National Statistical Agency HCP. The perspectives looked good: I knew several people in the HCP, as did my supervisor, Christophe Jalil Nordman, and had contacts in the Moroccan University. I had had the occasion to exchange on the possibility of collaborating on research projects with them, and the reception appeared to me to be positive. However, it turns out that I had underestimated the difficulty of getting access to data to Morocco, despite several warnings

of my advisors. After one year of negotiations that seemed to lead to nowhere, I had to change my stance.

A former colleague at the School of Governance and Economics, Hicham Hanchane (whom I salute in passing), was working with his brother Saïd on a contract with the *Observatoire National du Développement Humain* (ONDH) on an evaluation of the RAMED program of free health care for the poor. The ONDH was a small institution, created in 2008, responsible for the monitoring of the *Initiative Nationale pour le Développement Humain*, a nationwide policy of investment in social infrastructure and social economy, launched in 2005 by the King of Morocco. While officially situated under the direct authority of the Prime Minister, ONDH functions as an independent agency (the publication of its reports has to be approved by a board composed of members chosen *intuitu personae* among public administrations, civil society, academics, and the private sector<sup>10</sup>). A small and young institution, it was in the process of repositioning itself as a one-stop shop for the evaluation of public policies regarding development, and as such, was developing an internal statistical division, whose flagship product is an panel household survey, the first of its kind in Morocco (see below, 1.5.1).

As an informal member of the RAMED team, I was allowed to work onsite on this panel database, in a supervised manner. This work lasted approximately six months, and allowed me to take the measure of the dataset and its possibilities in terms of research. It still took a little more time, and several research stays, to gain acceptance and trust from the institution. An informal quid-pro-quo took place in which, in exchange for my support in the drafting of thematic reports linked to RAMED<sup>11</sup> as well as the preparation of several feedback meetings with officials from the relevant ministries (Health, Finance, and Interior Ministry)<sup>12</sup>, I was allowed to work on research papers based on ONDH data. This process was made easier by the restructuring of the statistical pole under the leadership of Abdelkader Teto, coauthor of the chapter 3 of this thesis, who brought the knowledge necessary to suitably clean the data in order to assuage concerns related to anonymity<sup>13</sup>.

Due to the nature of the data at hand, the main focus of the research shifted from labor market to health-related issues, although chapter 3 still touches on the interplay between health and labor supply. The next section outlines the main contributions of this thesis with regards to the issues outlined above.

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<sup>10</sup><http://www.ondh.ma/fr/organisation>

<sup>11</sup>Report on the targeting of Ramed (ONDH, 2016c), report on the financial governance of RAMED (ONDH, 2016b), report on healthcare demand (ONDH, 2016a), synthesis report (ONDH, 2017).

<sup>12</sup>in April 2016, February, May and June 2017, and in July 2018

<sup>13</sup>see the acknowledgments section for a full list of the persons and institutions that provided material and/or logistical support in this undertaking.

## 1.5 Contribution of this thesis

### 1.5.1 Dataset used in this thesis

All the remaining chapters of this thesis use the same source of data, the *Enquête Panel de Ménages* (EPM) conducted by the Moroccan Observatory for Human Development (ONDH). EPM is a multi-purpose panel household survey that started being collected in 2012. Three subsequent rounds of survey have been completed, in 2013, 2015, and 2017. This paper uses the first three rounds of this study. The survey is nationally representative, as well as representative for the urban and rural populations, and uses a three-stage sampling design. The original survey interviewed 8000 households, of which 7892 are exploitable, representing 37 444 individuals. In subsequent waves, members of the original households were re-interviewed, and a tracking of splitters (members who have left the original household for marriage or work reasons) has been conducted as well.

The EPM follows the structure of a LSMS-type survey, with a household roster, modules on labor market, education, and health, a specific module on reproductive and maternal health, a consumption module, as well as information on household durables, housing characteristics, credit incurred by the household, livestock and poultry, and landholdings. On top of that, the survey has specific modules on civic and community participation and perception of poverty that we exploit in chapter 4.

The EPM is the first longitudinal, nationally representative household survey that is conducted in Morocco, and one of the few in the Middle East and North Africa region. As such, it represents a valuable tool to investigate the multi-faceted links between health and poverty in the Moroccan context.

### 1.5.2 Summary of the chapters

**Free health care and healthcare access** In a context of strong informality and weak state capacity, one way to reconcile the need for healthcare financing while retaining basic equity in access to health care is to provide targeted fee waivers to the poorest. Such gratuity schemes have been increasingly popular over the past decade and a half, especially in Africa (Yates, 2009). These schemes, however, are often criticized on the ground that they weaken health care systems, by reducing own-account financing (Meessen et al., 2011; Ridde et al., 2012).

One of such schemes was introduced in Morocco in 2012. The RAMED program (*Régime d'Assistance Médicale*) intends to give free access to inpatient and outpatient hospital care to all the poor or near-poor population. Compared with other free health care policies, it has several distinctive features that make the study of its impact particularly

relevant. First, its scale: the declared objective was to cover one quarter of the population, representing more than 8 million individuals (2 million households). Second, the fact the primary care was already free at a network of dispensaries and health centers give rise to the possibility of substitution and demand shifting within the healthcare system.

In chapter 2, we assess the impact of the abolition of user fees on access to hospital care and on financial burden linked to health, using a difference-in-differences propensity score matching strategy. We find that enrollment in the program has led to a higher utilization of health services, but that this impact is restricted to rural households, implying that user fees were previously not a significant barrier to access for urban households. The RAMED hospital fee waiver is not linked to a reduction in the unconditional health expenditures, but has had a negative impact on the conditional health expenditure in urban areas. Overall, the chapter concludes to a moderate positive impact of the RAMED fee waiver scheme, although the effect seems to weaken over time, which could reflect increasing congestion effects as well as funding problems.

**Health shocks and labor supply reallocation within the household** Chapter 3 studies labor reallocation in the household following the health shocks of senior members (household head and/or the spouse). Labor reallocation has been hypothesized to be one of the mechanisms used by households to face sudden unexpected shocks in their income. Yet this might be limited by the lack of outside opportunities or by cultural norms preventing women to work outside the household. We find that illness of the household head is linked with increased labor force participation of children, especially for women and in urban areas. We also find evidence of a “reverse added worker effect” in the case of illness of the spouse, suggesting withdrawal from the labor market in order to provide informal care. Other coping mechanisms are studied as well. Our results are consistent with a demand-side explanation for youth unemployment, and for supply-side explanations for low female participation.

**Subjective poverty and comparison effects** Finally, the last chapter of this dissertation is concerned with the distribution of the feelings of poverty among Moroccan households. To a large extent, popular discontent in Morocco is disconnected from objective living standards: the poorest of the poor do not riot, while the waves of political protest have come from parts of the country that are relatively well-off. This is a challenge for public authorities, as well as for conventional anti-poverty thinking, that rests on the idea that increasing the lot of the worse-off is necessarily welfare-improving at the societal level. In this chapter, we test the hypothesis that the perception by the household of their poverty depends on their position with respect to the comparison groups

composed by the households surrounding them.

We find that perceptions of poverty are influenced by relative concerns, and that the sign of income comparisons depends on the geographical scale: positive for close neighbors, negative for more distant ones. The channels of the comparison effects are investigated, in order to exclude alternative explanations for the comparison effects: local public goods, local inequality, and social capital.



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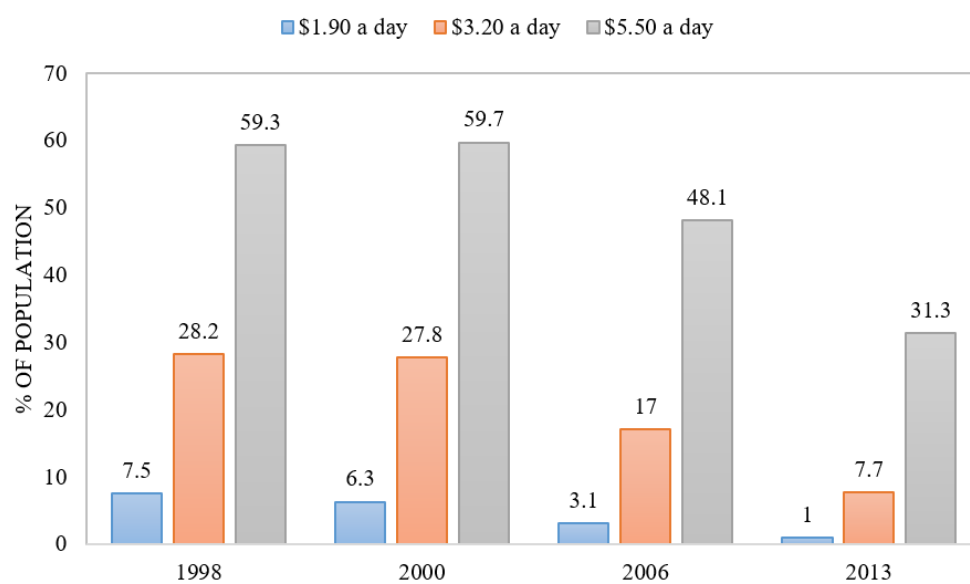
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# Appendices

## 1.A Additional figures

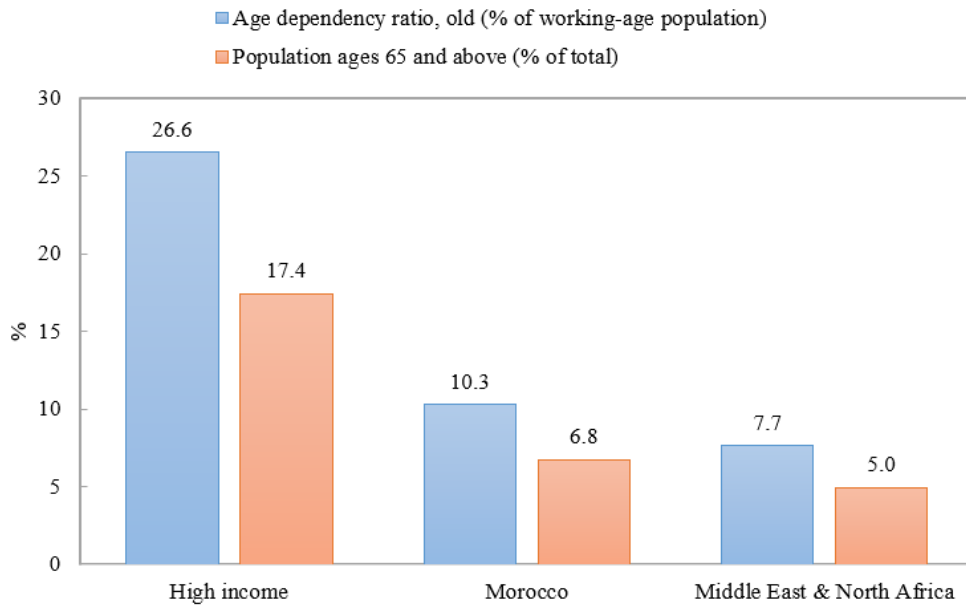
Figure 1.A.1 – Morocco: absolute poverty headcount



source: World Bank, WDI database.

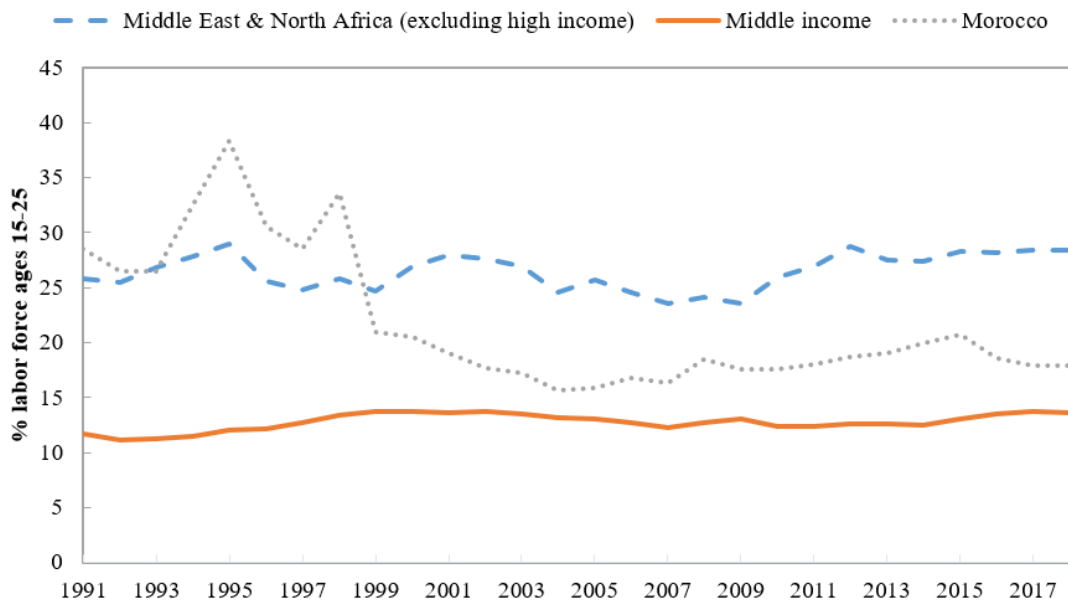


**Figure 1.A.2 – Dependency ratio and share of the elderly in the population**

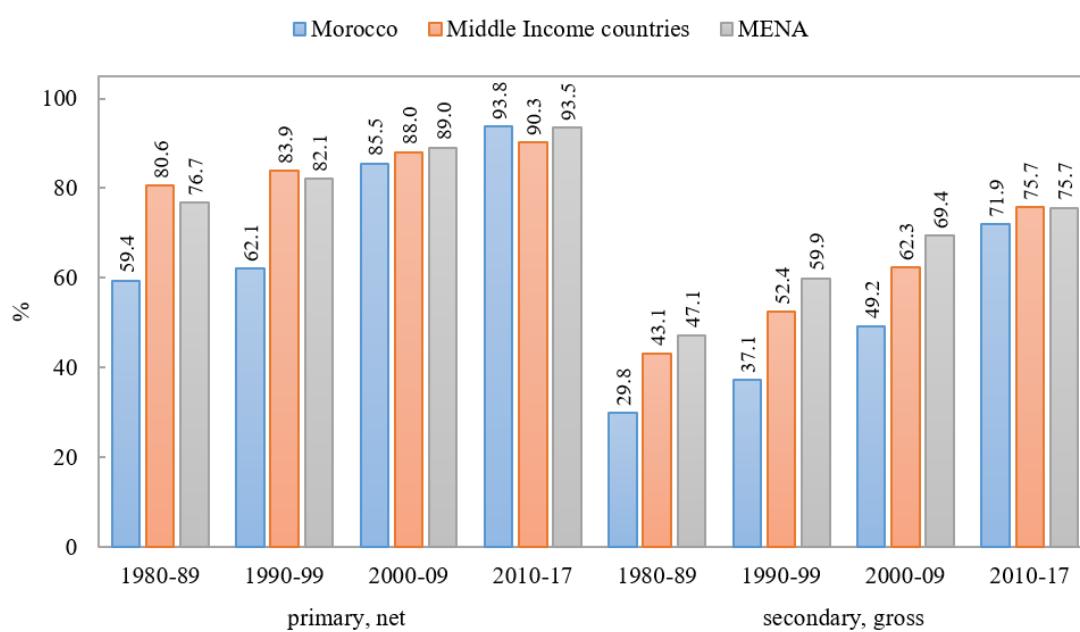


source: World Bank WDI

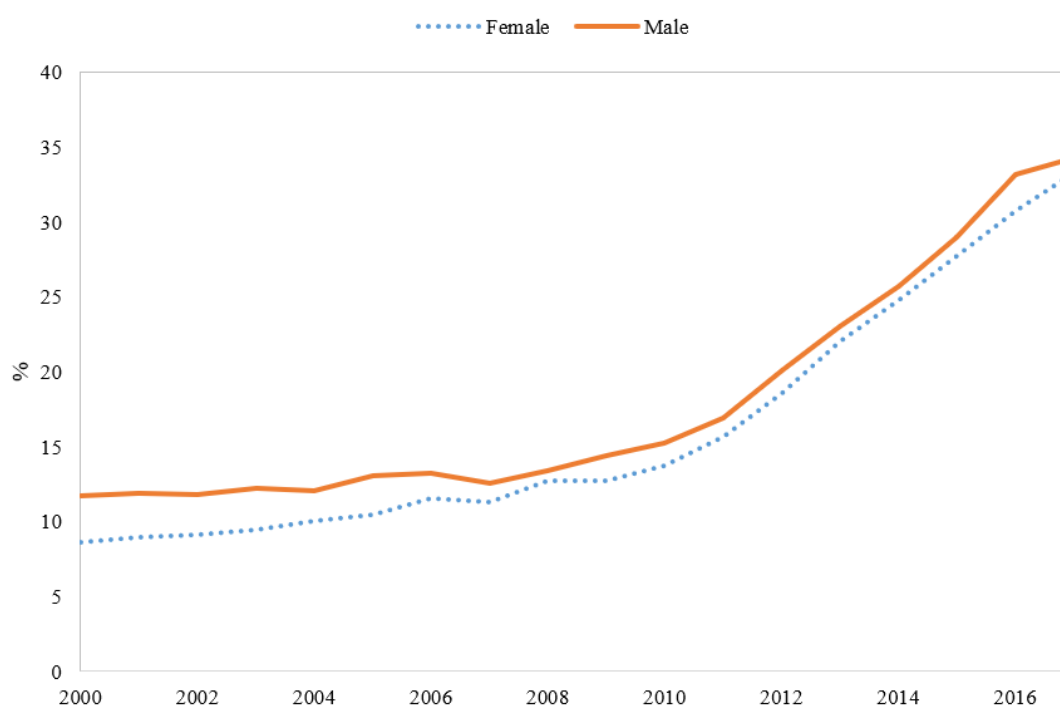
**Figure 1.A.3 – Youth unemployment rate**



source: World Bank WDI

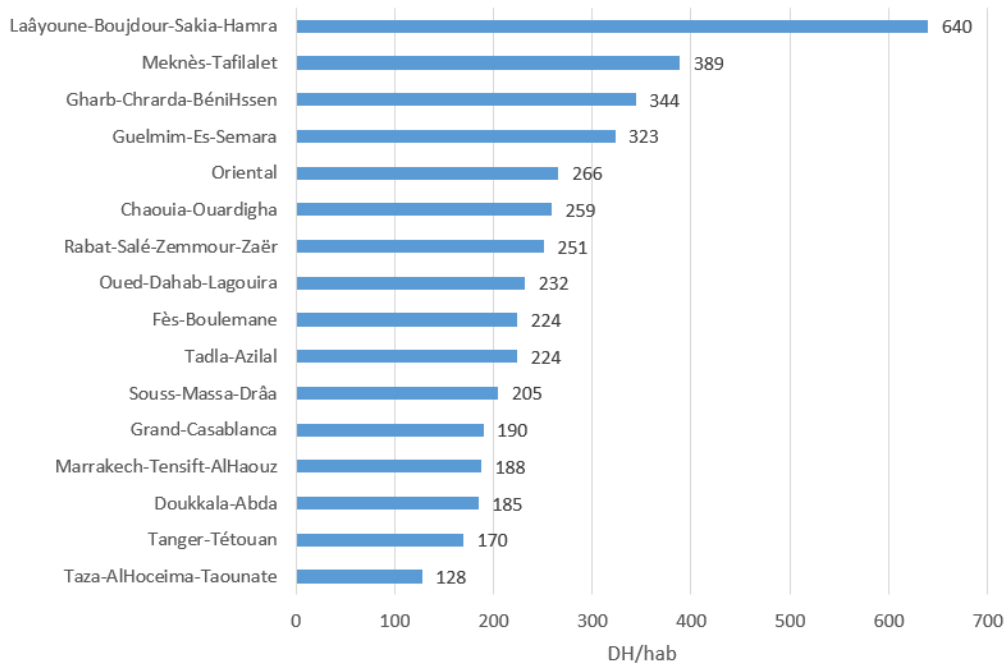
**Figure 1.A.4 – Enrollment rate in primary and secondary schooling**

source: WDI

**Figure 1.A.5 – Morocco: tertiary education, gross enrollment rate**

source: WDI

**Figure 1.A.6 – Spending of Health Ministry per inhabitant, by region, 2013**



source: Ministère de la Santé (2015a)

## 1.B Additional table

**Table 1.B.1** – Keywords used for the construction of figure 1.3

| <b>excluding macro/trade/finance</b><br><i>subjects excluded</i>  | <b>only micro/health/poverty</b><br><i>subjects included</i>                                     |
|---|--|
| economic development: financial markets; saving and capital investment; corporate finance and governance        | economic development: human resources; human development; income distribution; migration         |
| financial institutions and services: government policy and regulation   | micro analysis of farm firms, farm households, and farm input markets                            |
| empirical studies of economic growth; aggregate productivity; cross-country output convergence                  | fertility; family planning; child care; children; youth  |
| development planning and policy: trade policy; factor movement; foreign exchange policy                         | microeconomic analyses of economic development   |
| financing policy; financial risk and risk management; capital and ownership structure; value of firms; goodwill | health: government policy; regulation; public health   |
| production; cost; capital; capital, total factor, and multi-factor productivity; capacity                       | welfare, well-being, and poverty: government programs; provision and effects of welfare programs |
| information and market efficiency; event studies; insider trading   | human capital; skills; occupational choice; labor productivity                                   |
| fiscal and monetary policy in development   | measurement and analysis of poverty  |
| macroeconomics: production  | health behavior  |
| financial markets and the macroeconomy  |  |
| international investment; long-term capital movements   |  |
| international monetary arrangements and institutions  |  |
| economic integration  |  |
| business fluctuations; cycles   |  |
| macroeconomic analyses of economic development  |  |
| trade policy; international trade organizations   |  |
| asset pricing; trading volume; bond interest rates  |  |
| international financial markets   |  |
| foreign exchange  |  |
| monetary policy   |  |

source: Econlit



# Chapter 2

## Free health care for the poor: a good way to achieve universal health coverage? Evidence from the RAMED program

### Contents

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|            |   |            |
|------------|---|------------|
| <b>2.1</b> | <b>Introduction</b>   | <b>63</b>  |
| <b>2.2</b> | <b>Country and policy context</b>   | <b>65</b>  |
| <b>2.3</b> | <b>Relevant Literature</b>  | <b>70</b>  |
| <b>2.4</b> | <b>Data and empirical strategy</b>  | <b>73</b>  |
| 2.4.1      | Data  | 73         |
| 2.4.2      | Empirical strategy  | 74         |
| <b>2.5</b> | <b>Targeting and the (im)possibility of a regression-discontinuity design</b> | <b>75</b>  |
| <b>2.6</b> | <b>Descriptive statistics</b>   | <b>79</b>  |
| <b>2.7</b> | <b>Results</b>  | <b>81</b>  |
| 2.7.1      | Affiliation to RAMED  | 81         |
| 2.7.2      | Consultation  | 86         |
| 2.7.3      | Health expenditures   | 91         |
| 2.7.4      | Covariate balance and common support  | 93         |
| <b>2.8</b> | <b>Conclusion and discussion</b>  | <b>93</b>  |
|            | <b>References</b>   | <b>98</b>  |
|            | <b>Appendices</b>   | <b>103</b> |

|   |            |
|---|------------|
| <b>2.A Targeting of RAMED . . . . .</b> | <b>103</b> |
| <b>2.B Additional figures . . . . .</b> | <b>111</b> |
| <b>2.C Additional tables . . . . .</b>  | <b>113</b> |

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## 2.1 Introduction

What is the most efficient and socially equitable way to finance health care in low and middle income countries? Given the prevalence of informal work, social health insurance and other pre-financing systems generally appear unsuitable; on the other hand, administrative capacity constraint and the limited tax base seem to preclude broad-based tax-financed systems (Schieber and Maeda, 1999). In the wake of the Bamako Initiative (1987), a policy consensus was reached recommending the use of cost-recovery in the form of user fees in order to secure the supply of drugs and improve the quality of care in low-income countries (Gilson and Mills, 1995). Yet, despite some early successes (Litvack and Bodart, 1993), the performance of cost-recovery policies inspired by the Bamako Initiative remain controversial (Lagarde and Palmer, 2011; McIntyre, Thiede, Dahlgren, and Whitehead, 2006).

In the past ten years, increased fiscal space have led several developing countries to make progress towards the objective of universal health care (UHC). These advances are often made in a piecemeal fashion and do not follow simple, pre-existing strategies (Lagomarsino et al., 2012). A policy trend that is gaining traction is the removal of user fees and the return to free health care provision. While these policies often have important effects upon being implemented, their continued effectiveness has been questioned due to concerns about the sustainability of their financing (Yates, 2009).

This renewed interest in free primary care parallels a recent trend in the micro-development literature. Randomized control trials have shown that ‘free’ health interventions may have big effects on demand; even a modest price may deter utilization, beyond what static demand models would predict (Cohen and Dupas, 2010; Powell-Jackson et al., 2014). These studies often conclude to a positive cost-benefit of free health care, once externalities are accounted for. However, this does not ensure that these benefits will materialize if and when the pilot programs or experiments are generalized, due to the prevalence of implementation issues (Lagarde and Palmer, 2011; Lépine, Lagarde, and Le Nestour, 2018).

This chapter aims at providing evidence concerning the real-world effect of one such gratuity program, the medical assistance regime (RAMED) put in place in Morocco in 2012. Compared to other free health care initiatives, this policy has several original features. First, health services being already provided free of charge in public health dispensaries, the gratuity concerns tertiary health services at state hospitals, which were previously subject to fee-for-service. Second, the benefits of the program are reserved to the poor, the program making use of a targeting system through proxy means testing.

We use a new, nationally representative household panel survey to estimate the effect



of the RAMED on consultation behavior and on the healthcare expenditures of households. The questions of access and financial burden are relevant because, *a priori*, the effects of such a policy are ambiguous. Following gratuity, we would expect healthcare demand to increase in public hospitals, but this does not necessarily mean that the net effect will be positive; an increase in demand might come from a substitution of public for private suppliers of care. Moreover, the effect on the financial burden of households is uncertain, as it may cause some households that were previously excluded from health services to consume more, and thus to increase their income share devoted to health. These questions are all the more relevant that Morocco is a lower middle income country, whereas most of the evidence we have comes from low-income countries; and it belongs to a geographical area, Middle East and North Africa, for which the evidence on health systems performance is scarce.

Our empirical strategy relies on a combination of propensity score matching (PSM) with panel difference-in-differences estimation, aiming at controlling for the selection bias based on observable as well as time-invariant unobservables linked to program participation and outcomes. We estimate our model separately for urban and rural areas. Another originality of our paper is that we are able to separate short-run effects (during the ramp-up of the policy) from medium-term effects, after the policy has effectively been extended.

Our main result is that the RAMED gratuity program for hospital care has had a positive effect on health care demand for households in rural areas. This effect is ‘net’, i.e. it does not come from a shift in demand from public to private facilities. Compared to the counterfactual, there is no discernible effect on health care access in urban areas. However, for urban households, the policy has led to a reduction in *conditional* health care expenditures, i.e. a reduction of the financial burden for households that have recurring expenses linked to health. Finally, it is linked with a slightly higher budget share devoted to health in rural areas. Overall, our results points towards pre-existing financial barriers to health care for poor, rural population, and militate in favor of a re-orientation of the program towards those households.

The chapter is structured as follows. Section 2.2 gives institutional details on the policy under study. Section 2.3 reviews the academic literature relevant to our question. Section 2.4 presents the data as well as the empirical strategy used. In section 2.5, we examine in further detail the targeting mechanism used in the case of RAMED, in order to explain why a regression discontinuity design was not a feasible option. We show and discuss descriptive statistics in section 2.6, while section 2.7 contains our empirical results. The final section discusses the results and concludes.

## 2.2 Country and policy context

**Health and health care in Morocco** A lower-middle income country, Morocco has a GDP per capital below the average of the Middle East and North Africa region (MENA). At 5.9% of GDP, global expenditure on health care is in line with the average of middle income countries, but due to a lower development level, this translates into a lower level of health care spending per capita in absolute terms: 446.6 USD PPP in 2014, compared to 712 USD in the MENA region and 581 USD in the average middle income country (cf. Table 1).

Morocco's overall health indicators are comparable to the regional average. Life expectancy at birth is 74 years, against a regional average of 73 years<sup>1</sup>. At 28 per 1000 live birth, under-5 mortality rate is below the average for middle income countries. The immunization rate against measles for children aged 12 to 23 month reaches 99 percent, above the regional average (86%) as well as the average of Middle Income countries (85%). Health care in Morocco is primarily financed through private expenditure, to a greater extent than in comparable countries. Public expenditure on health care represents less than 34% of total health expenditures, against 50% in the MENA region and 52% in middle income countries. Private expenditures on health care are primarily constituted by out-of-pocket spending (OOP); these represent 58.4% of total expenditure on health, compared to 44.3% in the MENA region and 36.1% in middle-income countries.

The prevalence of prepayment mechanism and health insurance is low. Before 2005, only civil servants had access to comprehensive health insurance. A law implemented in 2005 imposed mandatory health insurance to formal private sector workers, yet as of 2012 coverage rate was 20% of population. Coverage rates vary widely between urban and rural areas: in the last case, only 7% of the population has access to health insurance, against 30% in cities.

In the past 50 years, the country has put in place a network of health centers and free clinics that are open to all free of charge. Yet, health care supply is low in international comparison. In 2009, there were on average 0.62 physicians for 1000 inhabitants, against 1.31 in the region. In 2012, Morocco was one of the 57 countries in the world that were singled out by the WHO as having a number of physicians and nurses below 'critical thresholds' (Chauffour, 2017). Moreover, the supply is unevenly spread over the territory. For instance, there is on average 1.3 physician per 1000 inhabitants in the region of Casablanca (the economic capital), against 0.25 per 1000 inhabitants in the remote region of Taza-Al Hoceima.

Despite free primary care, financial barriers to health care remain an important issue

<sup>1</sup>All figures in this paragraph come from the World Bank Health Nutrition and population database, year 2014 unless specified. The regional averages exclude oil-producing countries

**Table 2.1** – national indicators on health and health care

|   | Morocco | MENA* | Middle Income |
|---|---------|-------|---------------|
| Life expectancy at birth (years)                                      | 74      | 73    | 71            |
| Mortality rate, under-5 (per 1,000 live births)                       | 28      | 23    | 40            |
| Immunization, measles (% of children ages 12-23 months)               | 99      | 86    | 85            |
| Health expenditure per capita, PPP                                    | 446,6   | 711,7 | 581,2         |
| Health expenditure, total (% of GDP)                                  | 5,9     | 6,3   | 5,8           |
| Out-of-pocket health expenditure (% of total expenditure on health)   | 58,4    | 44,3  | 36,1          |
| Health expenditure, public (% of GDP)                                 | 2,0     | 3,2   | 3,0           |
| Health expenditure, public (% of total health expenditure)            | 33,9    | 49,5  | 52,1          |
| Health expenditure, private (% of GDP)                                | 3,9     | 3,2   | 2,8           |
| Health expenditure, private (% of total health expenditure)           | 66,1    | 50,5  | 47,9          |
| Health expenditure per capita (current US\$)                          | 190,1   | 253,5 | 291,9         |
| Improved sanitation facilities (% of population with access)          | 76,7    | 89,6  | 65,3          |
| Improved water source (% of population with access)                   | 85,4    | 92,6  | 92,2          |
| Out-of-pocket health expenditure (% of private expenditure on health) | 88,3    | 87,6  | 75,3          |

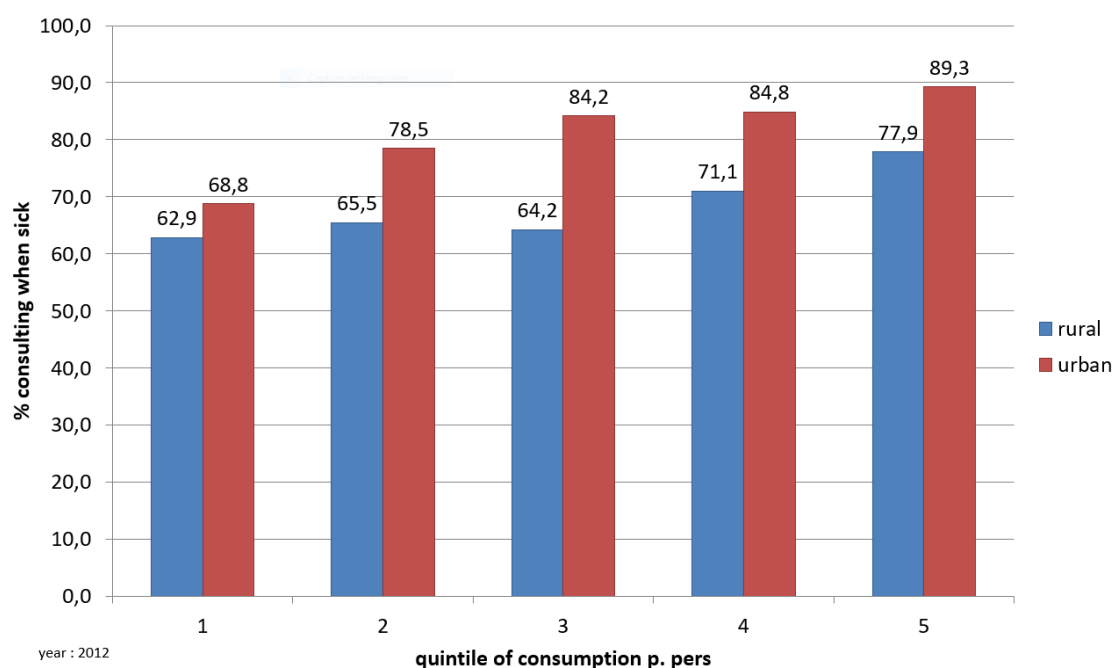
Source: World Bank WDI, year 2014 unless indicated

\* except high-income

in Morocco. Consultation rates in case of sickness exhibit a strong socio-economic gradient (Fig. 1): in urban areas they vary between 69% in the first quintile and 89% in the top quintile (in rural areas, the figures are respectively 63% and 78%). Among the people renouncing health care, 60% mention “not being able to pay” as the main reason (ONDH, 2013).

Like numerous low- and middle-income countries, a disproportionate share of public health spending is devoted to tertiary care sector, e.g. hospitals. It is also among this sector that financial barriers to access are the most salient, as hospital care is subject to user fees for patient without health insurance. Before 2012, the very destitute benefited from a fee waiver known as the *certificat d'indigence* (“certificate of destitution”). Yet, this ancient mechanism (it was put in place in 1913 by the French colonial administration) was widely perceived as being insufficient to counter financial barriers to hospital care, due to several limiting features. The certificate was valid for only one person (no coverage of dependents), and for one medical care episode (limited validity in time). Furthermore, the eligibility criteria were never specified formally, and its delivery by local officers was subject of widespread suspicions of corruption.

**RAMED, a targeted scheme for waiving hospital fees** A reform of the certificate d'indigence was envisioned starting in the mid-90s. The new system, known as RAMED (an acronym for *Régime d'Assistance MEDicale*, or “medical assistance

**Figure 2.1** – Consultation rates by consumption quintile, 2012 (source: ONDH)

regime”) was supposed to cover all persons without health insurance below a certain monetary poverty threshold, approximately equivalent to 1.8 USD per person and per day, and representing one quarter of the population (8.5 million individuals). The RAMED card was supposed to cover the entire household, and to have a validity of two years. Holders of the cards were to be entitled to free health care in public hospitals.

Initially, the system was to be financed mainly through fiscal revenues, completed by contributions by the communes and beneficiaries themselves. The hospitals were supposed to be directly reimbursed for the treatment of RAMED patients through a third-party buying agency. Ex-ante, the cost of the new scheme was projected at approximately 5.3 Bn of Moroccan dirhams per year (approx. 530 M USD), or 630 DH per beneficiary and per year (63 USD), representing 0.5 of GDP.

Eligibility to the RAMED system is determined through a proxy means test, based on characteristics of households’ dwelling (such as the number of rooms, its connection to the electricity and sanitation grid), possession of consumer durables, and the possession of livestock in rural areas (see section 2.5 for a more detailed discussion). At this point, two institutional details are worth mentioning:

- As well as discriminating between eligible and non-eligible households, the proxy means tests sorts eligible households in two categories : the “very destitute” on one hand, that receive the RAMED card free of charge (corresponding to a living standard of less than 0.9 USD per person and per day); and the “vulnerable” on the

other hand, that had to pay a contribution of 120 DH (12 USD) per person and per year to obtain the card giving access to free health care;

- The selection and attribution process is supervised by the Interior Ministry. The attribution commissions retain a modicum of flexibility in their decision to grant or not the benefit of RAMED to an applicant household; according to the relevant Ministerial decrees, the ‘score’ given by the proxy-means test is only a guide for the commission’s decision, who is free to operate re-classifications of households to non-eligible to eligible.

This design was supposed to provide a balance between the impartiality of the mechanism and some adaptability to the households real living conditions

**Implementation** RAMED was introduced nationwide in 2012, after a four-year pilot in one poor rural region of the country. The generalization of RAMed system was conducted in a context of political grievances following the Arab Spring, and was largely perceived as a political gesture destined to appease social tensions.

The new regime was widely marketed as ‘free health care for the poor’; yet the financing mechanisms to accommodate the influx of health care demand were not put in place until several years later. Only limited amounts of fiscal resource were affected to the special fund, which in turn did not do any disbursement until 2016<sup>2</sup>. The financial burden of caring for RAMED patients fell on the hospital themselves, which had to deal with an influx of new patients with unchanged resources (see figure 2 for an example in one big hospital of the country). This led to massive increases in waiting times, congestion, and shortages of medical material and medicine.

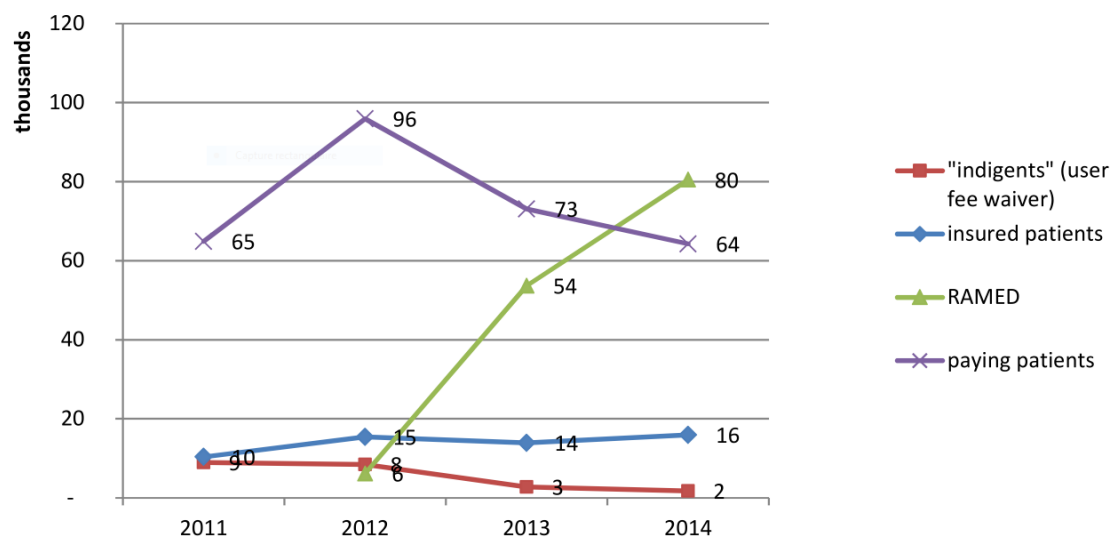
From the point of view of the hospitals, the introduction of an obligation to tend to RAMED patients without being able to charge user fees is akin to a system of ‘uncompensated care’, where hospitals are mandated to provide care for patients with no capacity to pay<sup>3</sup>.

Hospitals are capacity constrained and the prices charged are fixed administratively. An exogenous increase in demand for hospital care is thus likely to result in shortages, materialized through lengthening waiting times for chirurgical interventions, increased congestion and rotation, and lack of equipment and medication. In the literature, these phenomena come under the header “quality of care” (e.g. Alderman and Lavy, 1996; Litvack and Bodart, 1993). Another effect is the worsening of governance, in the form

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<sup>2</sup>Details relative to the funding and financial architecture of RAMED can be found in ONDH (2017).

<sup>3</sup>See Currie and Madrian (1999), for a quick overview of the place of uncompensated care in US health care system, and Wagner (2016) for an analysis of this mode of provision at the hospital level.

**Figure 2.2** – Fes University Hospital : number of patients by health coverage status, 2011-14

of kickbacks or “mandatory gifts” to doctors, a practice already widespread in Morocco previous to the introduction of RAMED (Transparency International, 2016).

A qualitative study commissioned by the National Observatory of Human Development (ONDH) found that, after the introduction of RAMED, public hospitals experienced higher waiting times and delays, an increased turnover rate for patients, numerous shortages, and frequent breakdowns of technical equipment due to intensive usage (ONDH, 2017). Degradation of the equipment appeared as a by-product of the hospitals diverting their investment and maintenance budgets towards treating patients. Doctors and medical personnel experienced heightened stress and discontentment, leading to a broad opposition to the policy among professionals.

These adverse effects on quality of care and hospital functioning do not preclude an increased access to health care for poor populations, if the introduction of RAMED is accompanied by sufficient demand shifting of better-off patients towards the private sector. There is indeed anecdotal evidence that insured patients have been driven towards care in the private health care sector following the introduction of RAMED and the subsequent degradation in healthcare quality. Thus, the net effect of the introduction of RAMED on access to health care depends on the interactions of two countervailing effects: the size of this crowding-out of solvable patients on the one hand, the demand-inducing effect of the abolition of user fees on poor people.

## 2.3 Relevant Literature

The dual relationship between health and economic status has long been recognized as one of the principal factors preventing some households from exiting poverty (Smith, 1999). Poor households face a higher risk of income loss due to ill-health, through foregone earnings on the labor market as well as a consequence of high out-of-pocket expenditures for health care. This relation between health and poverty is mediated through healthcare systems. Beyond some broad similarities (high level of out-of-pocket expenditure, low coverage rates of health insurance, focus on tertiary health care to the detriment of prevention, as described by Whitehead et al. 2001) there is considerable variation in the design and features of healthcare systems in low- and middle income countries (Lagomarsino et al., 2012). The assessment of the performance of healthcare systems in reaching better levels of health and protection against health risk is thus a major policy issue. Yet, evidence regarding the effect of various health systems on the health status of populations is hard to come by, due to the difficulty of finding exogenous sources of variation in health systems that are not correlated to health status (Card et al., 2009; Levy and Meltzer, 2008; Shigeoka, 2014; Tanaka, 2014). To avoid this difficulty, most studies focus on intermediate outcomes, such as healthcare utilization and out-of-pocket expenditures, and to what extent healthcare systems affect those (Peters et al., 2008).

**User fees and Bamako Initiative** In the context of developing countries, a debate that has focused the attention of researchers and health care practitioners is the question of whether to finance health care services mainly through general government budget, or whether to increase the financing of these services through user fees imposed at the point of care. “Cost-recovery” policies, consisting in increased user fees to finance the health care system, were promoted in the 1980s by multilateral institutions, in particular the World Bank (Akin, Birdsall, and De Ferranti, 1987). In a similar vein, the “Bamako Initiative” (1987) called for user fees accompanied by targeted exemptions for the poorest in order to increase the availability of essential drugs and increase the quality of care in Sub-Saharan Africa (Mills, 2014).

The empirical background to these policy recommendations were papers on the determinants of health care demand that concluded to a low price elasticity of demand for medical care, and as a consequence a low welfare impact of financing healthcare through direct payments. The robustness of this finding has later been questioned by papers that took better into account selection issues as well as the effect of quality of care and patient heterogeneity (Cissé, Luchini, and Moatti, 2004).

The “Bamako Initiative” is often regarded as a failure, due to the perception that the imposition of user fees has had a strong negative effect on healthcare utilization. Yet the

evidence regarding the effect of user fees in low and middle income countries is less clear cut. In a systematic review, Lagarde, Haines, and Palmer (2009) note that the majority of studies on this topic suffer from important methodological weaknesses; moreover, there are some instances where the imposition of user fees has not led to a significant decrease in health care demand (Dzakpasu, Powell-Jackson, and Campbell, 2013).

One objection against policies inspired by the Bamako initiative seems to be the difficulty of bringing about quality improvements following the imposition of user fees. Indeed, when accompanied by measurable quality improvements, there is evidence that user fees do not deter utilization of health facilities, even for poor households (Alderman and Lavy, 1996; Litvack and Bodart, 1993).

Another stumbling block for such policies is the difficulty of guaranteeing fairness through targeted fee exemption mechanisms. For instance, Flores, Ir, Men, O'Donnell, and Van Doorslaer (2013) note that in Cambodia, although fee waivers for poor household existed *de jure*, they were supposed to be attributed at the point of care. This situation generated conflicting incentives for the hospitals, which had to balance their solidarity objectives with the need of obtaining funding through user fees, and as such led to the hollowing out of this solidarity mechanism.

**Is free health care a credible alternative?** The perceived failure of cost-recovery policies has shifted the focus of developing countries towards alternatives policies to increase medical coverage, such as community-based health insurance or health equity funds (Flores, Ir, Men, O'Donnell, and Van Doorslaer, 2013; Jütting, 2004; Yilma, Mebratie, Sparrow, Dekker, Alemu, and Bedi, 2015). One option that has enjoyed much attention is the generalization of free health care through the suppression of user fees (Meessen, Hercot, Noirhomme, Ridde, Tibouti, Tashobya, and Gilson, 2011; Yates, 2009).

There is strong micro-level empirical evidence supporting such policies of user fees removal. Cohen and Dupas (2010) show in the context of a randomized controlled trial of malaria prevention policies that even a modest (and subsidized) price for antimalarial insecticide-treated bed nets had strong negative impact on usage, without increasing allocative efficiency, resulting in a very positive cost-benefit calculation in favor of free distribution of bed nets (when taking into account positive externalities). Fafchamps and Minten (2007) analyze the effect of the suspension of user fees for health care services in Madagascar following a disruptive domestic political episode, and find evidence of a significant increase of visits to health centers. Powell-Jackson, Hanson, Whitty, and Ansah (2014) conduct a randomized experiment in rural Ghana on the removal of user fees. They find increased utilization, reduced health spending, and improved health for



children that were suffering from anemia.

These papers rely on experimental or quasi-experimental design, and as such have a high internal validity. Yet, concerns about external validity remain, particularly when trying to evaluate whether the positive effects of removal of user fees would scale up when implemented at a national level. The qualitative “process evaluation” literature on the introduction of free health care stresses the disruptive effect that such policies have on overall healthcare systems (Ridde, Robert, and Meessen, 2012) . In contrast to targeted user fee exemptions, broad-based free health care schemes are generally the product of highly politicized, top-down decisions, presented as a ‘gift of the leader to the people’, but often lacking in financial and technical preparation. Those policies are generally followed by an increase in utilization by the population, but the “free” nature of health care remains partial, as patients frequently have to make up for lacking supply in medicine and consumables with their own funds. Moreover, broad-based free health care schemes are generally accompanied by a degradation in the quality of care and a diminishing trust between patients and health care professionals (Lagarde, Haines, and Palmer, 2009).

To our knowledge, there is little literature trying to reconcile the micro-evidence from quasi-experimental design with the qualitative observation of a disruptive effect of free health care on health systems. An exception is Lépine, Lagarde, and Le Nestour (2018), which uses a pooled synthetic control method to study the generalization of a policy of user fee removal in Zambia, and find no evidence of an increase in health care utilization, contrary to what pilot studies suggested.

**Benefit incidence of public expenditure on health care** Another way to study the effect of free health care policies is to look at them through the lens their effect health equity (Wagstaff and Van Doorslaer, 2000). On the domestic political scene, fee exemptions are often framed as policies aiming to increase the equity of the access to health care, by doing more for the poor.

The theoretical basis for the public provision of private goods in developing countries is that it can achieve distributional objectives, when the scope for tax and transfer policies is constrained by limited administrative capacity. Besley and Coate (1991) show that in a setting where a good can be purchased on a private market for a higher quality, the public provision of a lower quality version of this good, financed by a proportional tax, can lead to a redistribution from rich to poor, if demand for quality has a positive income-elasticity (i.e., if quality is a normal good). This argument applies in particular to services such as schooling and medical care, for which a higher quality version is usually available on the private market.

This theoretical argument seems to run contrary to the literature on benefit incidence, which tends to show that public spending on healthcare and education benefit disproportionately to the most favored classes in low-income countries (Van de Walle, 1998). For the specific case of health care services, national and cross-country studies find that the overall incidence of public spending in poor countries is generally regressive, benefitting more than proportionally to the better-off subpopulations (see Castro-Leal, Dayton, Demery, and Mehra (1999) for a study on six sub-Saharan African countries, and Van de Walle (1994) for a study on Indonesia). This pattern of regressive benefit incidence of public spending in health care is mainly due to lower utilization of tertiary services by the poor (hospital or specialty clinics). Thus, one way to make the public spending on healthcare more “pro-poor” is to divert demand from better-off categories of the population towards the private sector. Thus, a policy aiming at giving priority access to the public service to the least well-off people may achieve redistribution from rich to poor. The question of knowing whether such a policy is welfare increasing depends on the deadweights losses, if any, generated by such a policy.

## 2.4 Data and empirical strategy

### 2.4.1 Data

Our data comes from a panel household survey conducted in three waves between 2012 and 2015 by the National Observatory for Human Development (ONDH, *Observatoire National du Développement Humain*). At baseline, the survey is representative of the national, urban and rural population. The sample consists of 7853 households, corresponding to 37444 individuals, for a mean of 4.76 persons per household on average. The panel consists in a multi-purpose LSMS-type survey, of living conditions, with modules on consumption, consumer durables and equipment, characteristics of housing, as well as earnings and debt. Additionally, the questionnaire comprises a module on health and health care, eliciting information on self-declared morbidity and health care usage in the past 4 weeks for all members of the household. Finally, information on schooling and occupation are collected for all individuals, as well as a specific module on social inclusion and subjective poverty.

The baseline survey was conducted in 2012, between the months of april and july. Table 3.1 presents the structure of the data. In this paper, we use the household as our unit of observation throughout. At the national level, there is a 6.2% attrition rate between the first and the second wave and another 5.3% attrition between the second and the last wave, leading to a total attrition of 11.2% between the baseline and 2015.

**Table 2.2** – Panel structure

|                    | 2012 | 2013  | 2015  |
|--------------------|------|-------|-------|
| <i>national</i>    |      |       |       |
| # of households    | 7854 | 7370  | 6977  |
| % of previous wave |      | 93,8% | 94,7% |
| % of baseline      |      |       | 88,8% |
| <i>rural</i>       |      |       |       |
| # of households    | 3119 | 3022  | 2945  |
| % of previous wave |      | 96,9% | 97,5% |
| % of baseline      |      |       | 94,4% |
| <i>urban</i>       |      |       |       |
| # of households    | 4735 | 4348  | 4032  |
| % of previous wave |      | 91,8% | 92,7% |
| % of baseline      |      |       | 85,2% |

The survey was conceived and collected independently from the policy under study. As mentioned previously, the decision of generalizing RAMED was taken by the King, and caught the Health Ministry officials by surprise. As a result, even though the announcement was made in March 2012, the administrative process to collect the applications was not effective before September 2012, and the first cards were delivered at the end of the year. We thus consider the baseline wave of the panel to be a “pre-program” survey, although strictly speaking the program was announced before the data collection. For subsequent waves (2013 and 2015), the questionnaire was amended in order to collect information on the precise affiliation status of the individual with respect to RAMED: whether the individual is affiliated to RAMED or not, whether the affiliation is made in his/her own name or if he/she is covered through another individual in the household, and whether they have applied for the RAMED program but been denied or are still waiting for a reply from the administration.

## 2.4.2 Empirical strategy

Our goal is to estimate the effect of the RAMED hospital fee waiver on healthcare usage and on the financial burden of health. To identify the causal effect of RAMED, a suitable counterfactual for the potential outcome of treated individuals has to be constructed.

For each treated unit, we have two different sources of information from which to build such a counterfactual: first, the pre-treatment variables for the same household; second, the presence of comparable households in terms of observable covariates, who have not been treated (i.e. are not covered by RAMED). Our strategy exploits both sources of information in order to estimate the average effect of the treatment on the treated (ATT).

We follow Nolan (2008) and Yilma et al. (2012) in using a panel difference-in-differences propensity score matching method. First, we estimate the determinants of

being effectively affiliated to RAMEd using a propensity-score matching method. The goal of this step is to remove the selection bias into RAMEd coming from observable households characteristics, such as standard of living, health status of household members at baseline, and theoretical eligibility. To the highest extent possible, we retain only covariates likely to affect both the treatment status and the outcome status (Caliendo and Kopeinig, 2008).

In the next step, we estimate a panel difference-in-difference model between the treatment group and the comparison group, as defined by the propensity score. This step helps controlling for selection bias due to time-invariant unobservable factors such as attitude to risk or latent household head status.

We conduct the analysis at the national level, as well as separately between urban and rural household. In addition, we estimate the panel diff-in-diff model for the whole time period under consideration (2012-2015), as well as over subperiods: 2012-2013 and 2013-2015. The division in two subperiods is relevant from a policy point of view: there is qualitative evidence of congestion phenomena taking place in public hospitals (ONDH, 2017). To the extent that this is the case, this would be a violation of the stable unit treatment assumption (SUTVA) underlying the potential outcome framework (Angrist and Pischke, 2009).

To construct our propensity score, we use a kernel matching algorithm based on a Gaussian kernel with a 0.2 bandwidth (Leuven and Sianesi, 2003). The covariates used in the matching step are described in table 2.3 below.

## **2.5 Targeting and the (im)possibility of a regression-discontinuity design**

As mentioned above, the eligibility to RAMEd is subject to a multidimensional proxy-means test. The fact that there are eligibility criteria based on observed characteristics of the household might lead one to prefer a regression-discontinuity type of strategy, with the theoretical eligibility as the source of discontinuity used as an identifying variation. However, several features of the implementation of the RAMEd program make this strategy unfeasible.

The conditions for eligibility are as follows. In rural areas, to be declared eligible, households have to fulfill two criteria:

- a “socio-economic score” criterion, based on a weighted sum of personal transportation mechanisms, the possession of a telephone line, and the number of water sources in the home. This score has to be inferior to 70 per person in the household

**Table 2.3 – Covariates, by residency and coverage status**

|                                 | rural         |               |               | urban         |               |               |
|---------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                                 | 2012          | 2013          | 2015          | 2012          | 2013          | 2015          |
| age of hh head                  | 51.29 (14.15) | 52.16 (13.94) | 53.81 (13.80) | 49.93 (13.39) | 51.38 (13.02) | 53.49 (12.92) |
| female hh head                  | 0.10 (0.29)   | 0.11 (0.31)   | 0.12 (0.33)   | 0.21 (0.41)   | 0.23 (0.42)   | 0.26 (0.44)   |
| <i>education of hh head</i>     |               |               |               |               |               |               |
| primary or lower                | 0.93 (0.25)   | 0.93 (0.25)   | 0.93 (0.25)   | 0.76 (0.43)   | 0.76 (0.43)   | 0.77 (0.42)   |
| lower secondary                 | 0.05 (0.22)   | 0.05 (0.22)   | 0.05 (0.22)   | 0.12 (0.33)   | 0.12 (0.32)   | 0.11 (0.32)   |
| upper secondary                 | 0.01 (0.11)   | 0.01 (0.11)   | 0.01 (0.11)   | 0.08 (0.27)   | 0.08 (0.28)   | 0.08 (0.27)   |
| higher ed.                      | 0.01 (0.09)   | 0.01 (0.09)   | 0.01 (0.09)   | 0.04 (0.20)   | 0.04 (0.19)   | 0.04 (0.20)   |
| <i>household structure</i>      |               |               |               |               |               |               |
| household size                  | 5.42 (2.55)   | 5.56 (2.60)   | 5.48 (2.47)   | 4.42 (2.02)   | 4.60 (2.07)   | 4.60 (2.00)   |
| # women                         | 2.68 (1.56)   | 2.77 (1.57)   | 2.72 (1.53)   | 2.24 (1.31)   | 2.36 (1.32)   | 2.39 (1.29)   |
| # children (<6 y)               | 0.88 (1.04)   | 0.89 (1.04)   | 0.86 (1.04)   | 0.61 (0.86)   | 0.58 (0.85)   | 0.55 (0.82)   |
| # elderly (>65 y)               | 0.34 (0.61)   | 0.35 (0.62)   | 0.41 (0.65)   | 0.23 (0.50)   | 0.26 (0.51)   | 0.33 (0.57)   |
| employment rate                 | 0.45 (0.26)   | 0.42 (0.25)   | 0.46 (0.26)   | 0.42 (0.29)   | 0.41 (0.28)   | 0.41 (0.28)   |
| # independent                   | 0.80 (0.82)   | 0.72 (0.78)   | 0.72 (0.78)   | 0.63 (0.71)   | 0.57 (0.68)   | 0.58 (0.69)   |
| # wage workers                  | 0.50 (0.77)   | 0.53 (0.75)   | 0.53 (0.78)   | 0.48 (0.72)   | 0.54 (0.75)   | 0.51 (0.75)   |
| <i>eligibility to RAMED</i>     |               |               |               |               |               |               |
| eligible 'poor'                 | 0.13 (0.34)   | 0.13 (0.34)   | 0.13 (0.34)   | 0.16 (0.37)   | 0.16 (0.37)   | 0.16 (0.37)   |
| eligible 'vulnerable'           | 0.41 (0.49)   | 0.41 (0.49)   | 0.40 (0.49)   | 0.07 (0.25)   | 0.07 (0.26)   | 0.07 (0.26)   |
| <i>quintile of wealth index</i> |               |               |               |               |               |               |
| 1st quintile                    | 0.52 (0.50)   | 0.51 (0.50)   | 0.49 (0.50)   | 0.02 (0.14)   | 0.02 (0.14)   | 0.02 (0.14)   |
| 2nd quintile                    | 0.37 (0.48)   | 0.37 (0.48)   | 0.37 (0.48)   | 0.13 (0.34)   | 0.12 (0.33)   | 0.09 (0.29)   |
| 3rd quintile                    | 0.08 (0.28)   | 0.09 (0.28)   | 0.10 (0.31)   | 0.36 (0.48)   | 0.35 (0.48)   | 0.32 (0.47)   |
| 4th quintile                    | 0.02 (0.13)   | 0.02 (0.14)   | 0.03 (0.16)   | 0.32 (0.47)   | 0.33 (0.47)   | 0.34 (0.47)   |
| 5th quintile                    | 0.01 (0.11)   | 0.01 (0.11)   | 0.01 (0.10)   | 0.18 (0.38)   | 0.18 (0.39)   | 0.23 (0.42)   |
| <i>health status</i>            |               |               |               |               |               |               |
| # of chronically ill            | 0.44 (0.71)   | 0.32 (0.63)   | 0.32 (0.59)   | 0.51 (0.74)   | 0.43 (0.70)   | 0.37 (0.66)   |
| # temporary ill                 | 0.19 (0.47)   | 0.17 (0.53)   | 0.19 (0.48)   | 0.20 (0.48)   | 0.15 (0.42)   | 0.20 (0.51)   |
| mean standardized BMI           | 23.31 (2.57)  | 23.22 (2.53)  | 23.21 (2.45)  | 23.62 (2.70)  | 23.70 (2.57)  | 23.49 (2.54)  |
| overweight                      | 0.95 (0.97)   | 0.94 (0.95)   | 1.06 (1.04)   | 0.97 (0.90)   | 1.06 (0.93)   | 1.20 (1.00)   |
| underweight                     | 0.04 (0.21)   | 0.05 (0.24)   | 0.05 (0.23)   | 0.03 (0.21)   | 0.03 (0.19)   | 0.05 (0.24)   |
| Observations                    | 2573          | 2513          | 2450          | 2417          | 2413          | 2254          |

Standard deviations in parentheses.

in order to be declared eligible (see table 2.A in appendix for the weights)

- a “patrimonial score” based on the weighted sum of farmland owned, livestock and poultry, and agricultural material. This score has to be inferior or equal to 6 in order to be declared eligible. The detail of the weights is presented in appendix table 2.A.2.

Table 2.A.2 presents the *ex-ante* distribution of the “rural socio-economic score”, and table 2.A.2 shows the “patrimonial score” in 2012.

In urban areas, the criteria that the households have to fulfill in order to be considered as eligible to RAMED are as follows:

- the “urban socio-economic score”, based on a weighted sum of the number of persons per room, the number of water points in the home, the connection to electricity, water and sewage, and the possession of a telephone, has to be lower than 11 (cf. table 2.A.4);
- the (self-declared) annual income per person in the household, weighted by living conditions - numbers of persons per room, presence of electricity and the number of bathrooms, and the possession of a personal mean of transport, has to be below 5650 DH (see table 2.A.4).

The *ex-ante* distribution of the urban socio-economic score as well as the weighted annual income per person are shown in figures 2.A.4 and 2.A.5 in appendix 2.A.

Some general remarks on this targeting mechanism<sup>4</sup>. First, some of the criteria appear quite outdated, such as the connection to electricity in urban areas or the possession of a cellphone. The criteria were developed by the statistical authority in cooperation with the World Bank in the early 2000s, based on household surveys conducted in the late 1990s (ONDH, 2016). Second, the inclusion of a targeting criterion based on self-declared income in urban areas seems to defeat the purpose of using the proxy means test, which is precisely to sidestep the difficulty of observing revenues in contexts of self-employment and informal labor (Grosh et al., 2008).

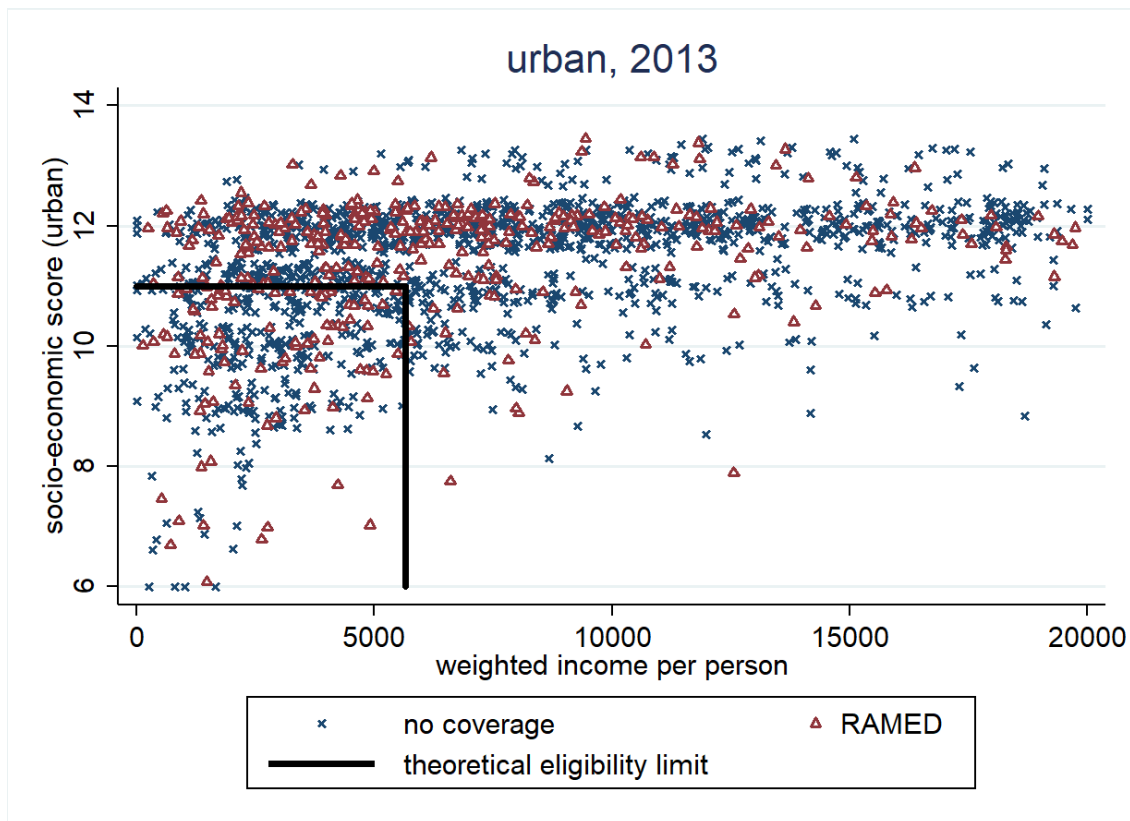
As a result, the targeting of the RAMED system, while mildly progressive in its final outcome, is largely unrelated to the outcome “on paper” of the multidimensional proxy means test. In fact, qualitative interviews with Interior Ministries officials, as well as regression analysis of the determinants of *effective affiliation* to RAMED seem to suggest the following attribution mechanism: the local decision commission attributes RAMED to the applicant’s if its file complies with the theoretical eligibility criteria; if not, they

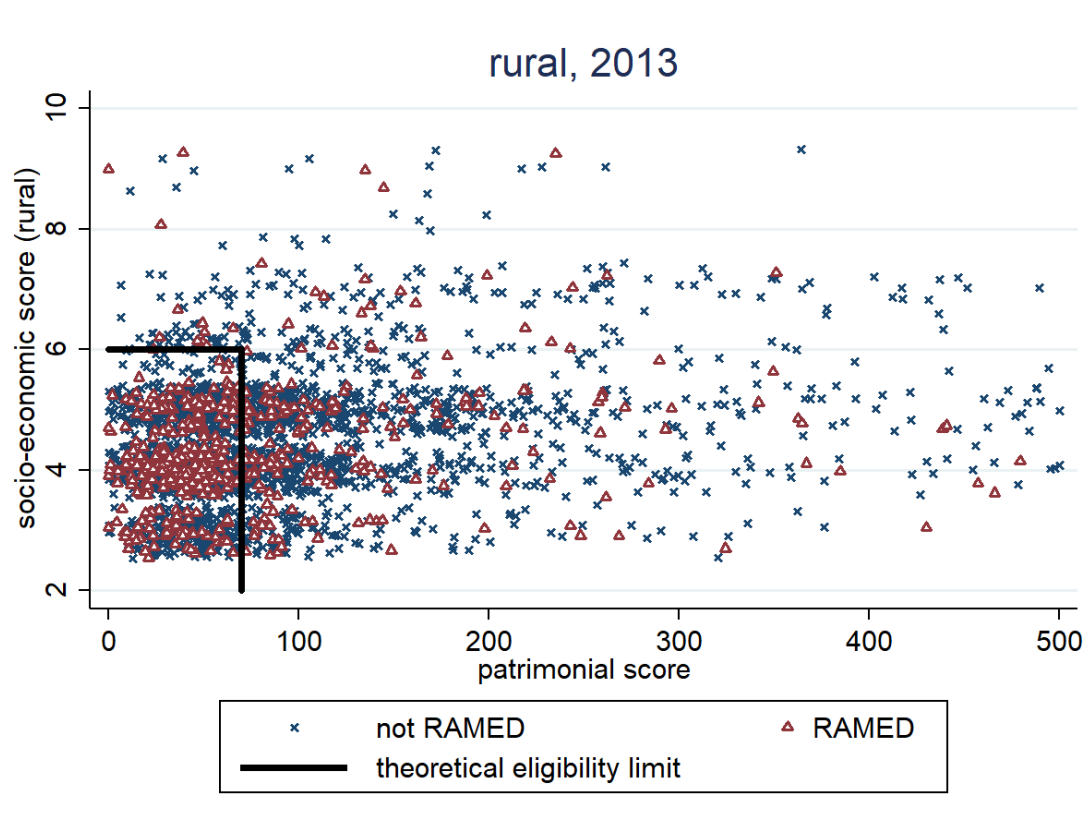
<sup>4</sup>A more thorough analysis of the targeting mechanism is found in Cottin (ress)

make a decision on a case-by-case basis. As a result, the majority of ultimate RAMED beneficiaries do not comply with theoretical eligibility criteria<sup>5</sup>.

Figures 2.3 and 2.4 show, for the year 2013, the RAMED affiliation status of the households according to the residency-specific eligibility criteria. The criteria are computed based on the previous-year value (i.e, on the baseline wave), in order to avoid declarative bias. It is apparent that there is no discontinuity, even a fuzzy one, at the theoretical eligibility limit, in either area. Thus, a regression discontinuity approach appears impossible in this setting. However, the fact that the final attribution decision is made in an ad-hoc manner, with idiosyncratic criteria that may vary between various commissions provides a good setting for the implementation of a propensity score-matching strategy, as it guarantees ample common support between treated and control group.

**Figure 2.3** – Affiliation to RAMED in 2013 by theoretical eligibility criteria, urban



**Figure 2.4** – Affiliation to RAMED in 2013 by theoretical eligibility criteria, rural

## 2.6 Descriptive statistics

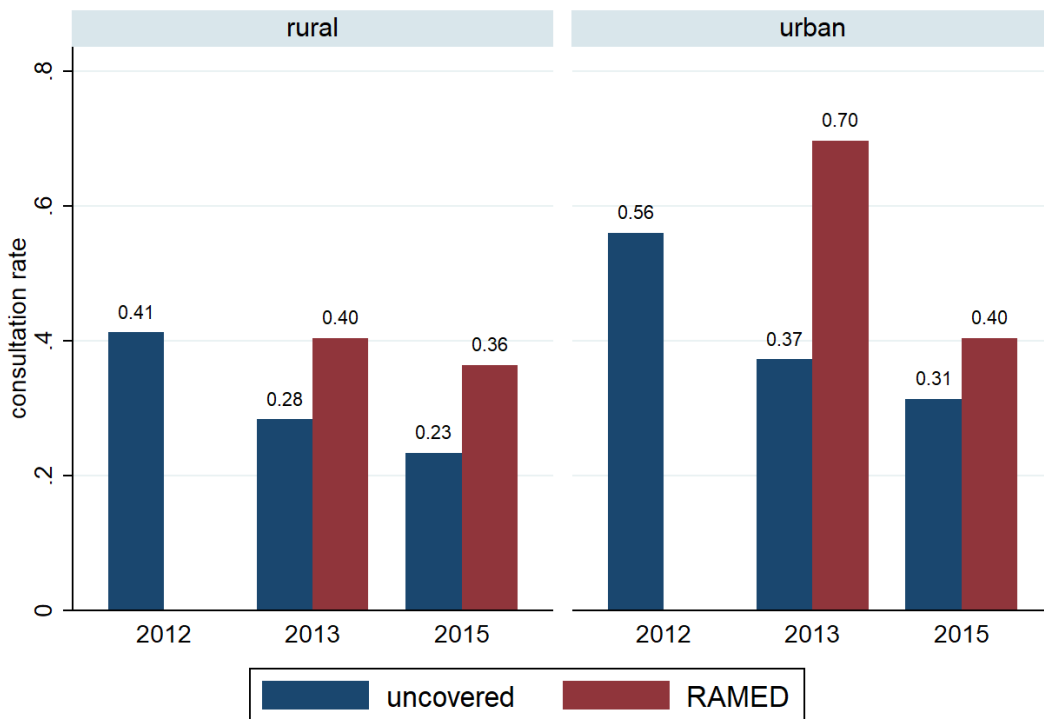
Figure 2.5 depicts the consultation rate at the household level, by year and by coverage status<sup>6</sup>. Households declaring any kind of medical consultation (at hospital, dispensaries, or private practices) in the previous 4 weeks receive a value of one. Several stylized facts emerge. First, the consultation rate is higher in cities than in rural areas, which reflects both the higher living standards in urban areas, as well as the higher density of healthcare supply. Second, households covered by RAMED have higher consultation rates than uncovered households (the gap between RAMED and uncovered households goes from 9 percentage points, for urban households in 2015, to 33 percentage points in 2013 for the same areas). Third, there seems to be a general downward trend in consultation rates year after year. Table 2.4 shows that this is also the case in the entire population, as well as for different types of consultation (private or public, outpatient or hospital). Figure 2.B.1 in the appendix shows that it also is the case among households benefitting from health insurance (civil servants or employees of the private formal sector). One possible

<sup>5</sup>This doesn't imply that these households are not poor: as mentioned above, the poverty line that the Proxy means test is supposed to approximate is a very low one, close to the extreme poverty line.

<sup>6</sup>we exclude from the analysis all households covered by the health insurance of the public sector or of the private formal sector)



**Figure 2.5** – Consultation rates by year and coverage type



source: ONDH

explanation for this downward trend in the consultation rate is the progressive attrition of older people from the panel due to mortality, these individuals also being those with the highest demand for health care.

Table 2.4 gives the average health expenditure per capita, by year and residency, as well as the mean budget share devoted to health. The average health expenditure per capita is lower in the 2013 compared to other years, in urban as well as in rural areas (7% lower compared to 2012 in rural areas; minus 25% in urban areas). This could reflect the effect of RAMED, seasonality, or systematic measurement error.

Table 2.5 presents descriptive statistics (mean and standard deviation) of the covariates used in our empirical specification, based on the pooling of the 2013 and 2015 waves. In urban areas, households covered by RAMED appear to differ systematically from uncovered ones: their heads are older, they are more likely to be female-headed than their uncovered counterparts, and they have more children and females. They also belong to lower wealth quintiles, and have a lower average BMI. In rural areas, RAMED households differ less systematically from uncovered households. This may be a reflection of the higher degree of homogeneity in living conditions prevailing in the countryside. Overall, households covered by RAMED have in common to have a higher rate of self-declared morbidity, as well to be more likely fulfill the theoretical criteria for eligibility

**Table 2.4** – Outcome variables, by year

|                                      | rural             |                   |                   | urban              |                    |                    |
|--------------------------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|
|                                      | 2012              | 2013              | 2015              | 2012               | 2013               | 2015               |
| health exp./pers (DH)                | 710.7<br>(2138.7) | 662.3<br>(2043.3) | 767.6<br>(2513.8) | 1573.1<br>(4461.1) | 1174.1<br>(2824.4) | 1535.7<br>(5249.7) |
| health budget share (%)              | 8.3<br>(8.7)      | 9.6<br>(8.3)      | 9.4<br>(8.7)      | 11.2<br>(10.3)     | 11.9<br>(8.4)      | 11.2<br>(9.7)      |
| any consultation (0/1)               | 0.331             | 0.246             | 0.240             | 0.446              | 0.334              | 0.288              |
| consultation in public sector (0/1)  | 0.154             | 0.134             | 0.118             | 0.211              | 0.166              | 0.123              |
| consultation in private sector (0/1) | 0.184             | 0.115             | 0.118             | 0.241              | 0.171              | 0.161              |
| outpatient consultation (0/1)        | 0.215             | 0.148             | 0.155             | 0.285              | 0.201              | 0.194              |
| hospital consultation (0/1)          | 0.127             | 0.100             | 0.081             | 0.171              | 0.137              | 0.089              |
| Observations                         | 3119              | 3022              | 2945              | 4735               | 4348               | 4032               |

mean of variables, standard errors in parentheses.

monetary values (DH) adjusted for inflation using CPI

to the scheme (60% against 51% in rural areas; 27% against 8% in urban areas).

## 2.7 Results

### 2.7.1 Affiliation to RAMED

We first take a look at the estimation of the propensity score for affiliation to RAMED. We use a probit model at the household level to estimate the determinants for “early entrants” (the household who affiliated between 2012 and 2013) and for “followers” (those who affiliated to RAMED between 2013 and 2015). In the appendix, we show the estimate for the entire time interval under consideration (from 2012 to 2015).

The marginal effects for the probit models are shown in tables 2.6 and 2.7. We conduct the estimation at the national level (column 1) and by residency (columns 2 and 3). Covariates of our models include characteristics of the household head (age and age squared, education, gender), household structure and activity profile, theoretical eligibility to RAMED, quintile of wealth, and various measures of health status at the household level: the number of chronically and temporary ill members, the mean standardized Body Mass Index (BMI) of all members age 20 to 60, and the number of overweight and underweight members in the household, based in individual BMI.

In 2013 (table 2.6), affiliation to RAMED at the national level is positively linked to the age of the household head (+0.08 p.p.) as well as to his gender: female-headed households have a +0.04 higher probability of being affiliated to RAMED compared to their male-headed counterparts. Affiliation is negatively linked to the education level of the head: households headed by an individual with no or only primary education

**Table 2.5** – Covariates, by residency and coverage status

|                       | rural     |       |       |        | urban     |       |       |        |
|-----------------------|-----------|-------|-------|--------|-----------|-------|-------|--------|
|                       | uncovered | RAMED | diff. | p-val. | uncovered | RAMED | diff. | p-val. |
| age of hh head        | 53.68     | 54.20 | -0.52 | 0.24   | 52.83     | 53.84 | -1.01 | 0.02   |
| household size        | 5.35      | 5.44  | -0.09 | 0.26   | 4.44      | 4.64  | -0.20 | 0.00   |
| # women               | 2.67      | 2.72  | -0.06 | 0.24   | 2.28      | 2.45  | -0.17 | 0.00   |
| # children (<6 y)     | 0.84      | 0.87  | -0.03 | 0.36   | 0.53      | 0.58  | -0.05 | 0.06   |
| # elderly (>65 y)     | 0.43      | 0.40  | 0.03  | 0.13   | 0.32      | 0.33  | -0.01 | 0.42   |
| employment rate       | 0.44      | 0.43  | 0.01  | 0.10   | 0.41      | 0.41  | 0.00  | 0.60   |
| # independent         | 0.72      | 0.66  | 0.06  | 0.02   | 0.55      | 0.58  | -0.03 | 0.23   |
| # wage workers        | 0.50      | 0.54  | -0.05 | 0.04   | 0.50      | 0.51  | -0.01 | 0.67   |
| # of chronically ill  | 0.30      | 0.41  | -0.12 | 0.00   | 0.37      | 0.51  | -0.14 | 0.00   |
| # temporary ill       | 0.17      | 0.19  | -0.01 | 0.40   | 0.16      | 0.21  | -0.05 | 0.00   |
| mean standardized BMI | 23.20     | 23.18 | 0.02  | 0.77   | 23.70     | 23.41 | 0.29  | 0.00   |
| overweight            | 0.94      | 1.00  | -0.06 | 0.04   | 1.07      | 1.09  | -0.03 | 0.40   |
| underweight           | 0.04      | 0.06  | -0.02 | 0.01   | 0.03      | 0.05  | -0.01 | 0.08   |
| female hh head        | 0.12      | 0.15  | -0.03 | 0.01   | 0.24      | 0.29  | -0.05 | 0.00   |
| primary or lower      | 0.93      | 0.94  | -0.01 | 0.14   | 0.75      | 0.81  | -0.06 | 0.00   |
| lower secondary       | 0.05      | 0.04  | 0.01  | 0.25   | 0.11      | 0.11  | 0.00  | 0.63   |
| upper secondary       | 0.01      | 0.01  | 0.00  | 0.75   | 0.09      | 0.06  | 0.03  | 0.00   |
| higher ed.            | 0.01      | 0.01  | 0.00  | 0.33   | 0.05      | 0.02  | 0.02  | 0.00   |
| eligible 'poor'       | 0.12      | 0.17  | -0.05 | 0.00   | 0.14      | 0.18  | -0.04 | 0.00   |
| eligible 'vulnerable' | 0.39      | 0.43  | -0.04 | 0.00   | 0.06      | 0.09  | -0.02 | 0.00   |
| 1st quintile          | 0.52      | 0.48  | 0.04  | 0.02   | 0.02      | 0.03  | -0.01 | 0.06   |
| 2nd quintile          | 0.36      | 0.39  | -0.03 | 0.02   | 0.10      | 0.12  | -0.02 | 0.05   |
| 3rd quintile          | 0.09      | 0.10  | -0.01 | 0.31   | 0.31      | 0.38  | -0.07 | 0.00   |
| 4th quintile          | 0.02      | 0.02  | 0.00  | 0.65   | 0.33      | 0.32  | 0.01  | 0.52   |
| 5th quintile          | 0.01      | 0.01  | 0.00  | 0.37   | 0.23      | 0.14  | 0.09  | 0.00   |
| Observations          | 5279      |       |       |        | 4987      |       |       |        |

Pooled means for 2013 and 2015 waves. p-val denotes the p-value associated to a t-test (resp. p-test for binary variables) of difference of means.

**Table 2.6** – probit model of RAMED affiliation in 2013, by residency

|                                 | (1)<br>national |         | (2)<br>rural |         | (3)<br>urban |         |
|---------------------------------|-----------------|---------|--------------|---------|--------------|---------|
| urban                           | 0.011           | (0.013) | .            | .       | .            | .       |
| age of hh head                  | 0.007***        | (0.002) | 0.005        | (0.004) | 0.009***     | (0.003) |
| square age of hh head           | -0.000***       | (0.000) | -0.000       | (0.000) | -0.000***    | (0.000) |
| female hh head                  | 0.034***        | (0.012) | 0.028        | (0.025) | 0.031**      | (0.012) |
| <i>education of hh head</i>     |                 |         |              |         |              |         |
| primary or lower                | 0.074***        | (0.020) | 0.070        | (0.055) | 0.066***     | (0.018) |
| lower secondary                 | 0.038           | (0.024) | 0.014        | (0.064) | 0.044**      | (0.022) |
| higher ed.                      | -0.053*         | (0.032) | -0.071       | (0.096) | -0.033       | (0.029) |
| <i>household structure</i>      |                 |         |              |         |              |         |
| household size                  | -0.004          | (0.003) | -0.001       | (0.005) | -0.003       | (0.004) |
| # women                         | -0.003          | (0.005) | -0.011       | (0.008) | 0.003        | (0.006) |
| # children (<6 y)               | 0.014***        | (0.006) | 0.008        | (0.009) | 0.020***     | (0.007) |
| # elderly (>65 y)               | 0.015           | (0.010) | -0.009       | (0.017) | 0.034***     | (0.011) |
| employment rate                 | -0.052***       | (0.017) | -0.085***    | (0.032) | -0.032       | (0.020) |
| # independent                   | 0.025***        | (0.006) | 0.019**      | (0.010) | 0.032***     | (0.007) |
| <i>eligibility to RAMED</i>     |                 |         |              |         |              |         |
| eligible 'poor'                 | 0.027**         | (0.013) | 0.077***     | (0.023) | -0.021       | (0.016) |
| eligible 'vulnerable'           | 0.025**         | (0.011) | 0.035**      | (0.016) | 0.025        | (0.018) |
| <i>quintile of wealth index</i> |                 |         |              |         |              |         |
| 1st quintile                    | 0.017           | (0.015) | 0.004        | (0.025) | 0.058*       | (0.034) |
| 2nd quintile                    | 0.002           | (0.014) | -0.009       | (0.026) | 0.013        | (0.016) |
| 4th quintile                    | -0.041***       | (0.013) | -0.171**     | (0.069) | -0.034***    | (0.012) |
| 5th quintile                    | -0.124***       | (0.017) | -0.038       | (0.061) | -0.116***    | (0.016) |
| <i>health status</i>            |                 |         |              |         |              |         |
| # of chronically ill            | 0.019***        | (0.005) | 0.022**      | (0.010) | 0.017***     | (0.006) |
| # temporary ill                 | 0.011           | (0.008) | -0.005       | (0.015) | 0.018**      | (0.009) |
| mean standardized BMI           | -0.004**        | (0.002) | -0.001       | (0.003) | -0.005***    | (0.002) |
| overweight                      | 0.001           | (0.005) | -0.005       | (0.009) | 0.002        | (0.006) |
| underweight                     | -0.026          | (0.022) | -0.053       | (0.041) | -0.013       | (0.023) |
| Observations                    | 6861            |         | 2846         |         | 4015         |         |

Standard errors in parentheses

\* p&lt;0.1, \*\* p&lt;0.05, \*\*\* p&lt;0.01

Marginal effects from a probit model of affiliation to RAMED in 2013 as a function of 2012 covariates.

have a +0.07 probability of being affiliated, compared to an high school-educated head; college-educated household heads have a -0.05 probability of being affiliated (the latter coefficient being significant at the 10% level only). The variables reflecting household demographic structure are generally not significant, except for the number of children, which is associated with a +0.01 probability of being affiliated. The proportion of the household in employment is negatively associated to the probability of being in affiliated (-0.05); the number of household members working as independents (as opposed to the omitted category of wage workers) is positively related to affiliation (+0.03). The theoretical eligibility of households to RAMEd, as reflected by the thresholds of the “proxy means test”, is significantly linked to effective affiliation three years later. Households who are classified as “poor” (i.e. household who are entitled to the RAMEd card for free) have a +0.027 probability of being affiliated to RAMEd in 2015; household who are categorized as ‘vulnerable’ in 2012 (those who have to pay a yearly premium of DH150 - approx. USD 15), have a +0.025 probability of being in the scheme in 2015. Both coefficients are significant at the 5% level. Wealth is negatively related to affiliation, in the sense that the top 2 quintiles have respectively a -0.04 and -0.12 probability of being affiliated, compared to the 3rd quintile. Finally, variables reflecting the health status and the risk of ill health at the household level are associated with an increased probability of RAMEd affiliation: the probability of affiliation increases by 0.02 for each chronically ill household member (temporary illness is not significant at the national level). It is also negatively associated with mean standardized BMI of adult members, which reflects the living standards of households (McLaren, 2007; Wittenberg, 2013). Overall, RAMEd affiliation seems to be related to three broad families of factors: negatively to ability to pay (as reflected by education and female head, employment rate and wealth quintile), positively with need for health care (as reflected by illness), and positively to statutory eligibility (although this last factor also reflects poor living standards).

Compared to the national level, some differences emerge when considering the determinants by residency (column 2 and 3). Education of the household head is not significant in rural areas; this presumably reflects the fact that the overall level of education is lower in the countryside. Conversely, the strength of the association between statutory eligibility status and effective affiliation seems to be higher in rural areas, as reflected by the coefficients on ‘eligible poor’ and ‘eligible vulnerable’ (respectively, 0.8 and 0.4). One interpretation for this is that the range of living conditions is narrower in rural areas. As a consequence, formal eligibility criteria weight more heavily on the decision by the authorities to grant access to RAMEd.

The determinants of gaining affiliation between 2013 and 2015, shown in table 2.7, are similar to those for gaining affiliation between 2012 and 2013. At the national level,

**Table 2.7** – probit model of new RAMED affiliation in 2015, by residency

|                                 | (1)<br>national |         | (2)<br>rural |         | (3)<br>urban |         |
|---------------------------------|-----------------|---------|--------------|---------|--------------|---------|
| urban                           | 0.007           | (0.017) | .            | .       | .            | .       |
| age of hh head                  | 0.002           | (0.003) | -0.001       | (0.005) | 0.006*       | (0.003) |
| square age of hh head           | -0.000          | (0.000) | 0.000        | (0.000) | -0.000**     | (0.000) |
| female hh head                  | 0.071***        | (0.014) | 0.083***     | (0.029) | 0.060***     | (0.015) |
| <i>education of hh head</i>     |                 |         |              |         |              |         |
| primary or lower                | 0.111***        | (0.023) | 0.132*       | (0.070) | 0.106***     | (0.022) |
| lower secondary                 | 0.100***        | (0.027) | 0.143*       | (0.078) | 0.086***     | (0.026) |
| higher ed.                      | -0.051          | (0.034) | 0.117        | (0.097) | -0.070**     | (0.034) |
| <i>household structure</i>      |                 |         |              |         |              |         |
| household size                  | -0.003          | (0.004) | 0.001        | (0.007) | -0.005       | (0.005) |
| # women                         | -0.001          | (0.006) | -0.008       | (0.010) | 0.003        | (0.007) |
| # children (<6 y)               | 0.011           | (0.007) | 0.015        | (0.011) | 0.006        | (0.009) |
| # elderly (>65 y)               | 0.021*          | (0.012) | 0.014        | (0.020) | 0.030*       | (0.016) |
| employment rate                 | -0.054***       | (0.021) | -0.098**     | (0.039) | -0.035       | (0.024) |
| # independent                   | 0.046***        | (0.008) | 0.041***     | (0.013) | 0.052***     | (0.010) |
| <i>eligibility to RAMED</i>     |                 |         |              |         |              |         |
| eligible 'poor'                 | 0.090***        | (0.016) | 0.122***     | (0.029) | 0.065***     | (0.020) |
| eligible 'vulnerable'           | 0.063***        | (0.014) | 0.083***     | (0.020) | 0.043*       | (0.025) |
| <i>quintile of wealth index</i> |                 |         |              |         |              |         |
| 1st quintile                    | -0.044**        | (0.020) | -0.078**     | (0.030) | -0.023       | (0.052) |
| 2nd quintile                    | -0.015          | (0.018) | -0.060**     | (0.030) | 0.021        | (0.021) |
| 4th quintile                    | -0.045***       | (0.016) | -0.064       | (0.059) | -0.035**     | (0.015) |
| 5th quintile                    | -0.146***       | (0.019) | -0.156**     | (0.076) | -0.123***    | (0.018) |
| <i>health status</i>            |                 |         |              |         |              |         |
| # of chronically ill            | 0.011           | (0.007) | 0.024*       | (0.014) | 0.007        | (0.009) |
| # temporary ill                 | 0.003           | (0.011) | 0.011        | (0.016) | -0.008       | (0.014) |
| mean standardized BMI           | -0.004*         | (0.002) | -0.009**     | (0.004) | -0.002       | (0.003) |
| overweight                      | 0.007           | (0.006) | 0.017        | (0.011) | -0.000       | (0.008) |
| underweight                     | -0.029          | (0.025) | -0.054       | (0.042) | -0.009       | (0.031) |
| Observations                    | 5976            |         | 2341         |         | 3635         |         |

Standard errors in parentheses

\* p&lt;0.1, \*\* p&lt;0.05, \*\*\* p&lt;0.01

Marginal effects from a probit model of affiliation to RAMED in 2015 as a function of 2013 covariates.

the main difference is that the number of chronically ill household members is no longer significant; neither is the number of children or the age of the household head. In contrast, the number of elderly in the household, which was insignificant in table 2.6, is now positive and significant at the 10% level. At the sub-national level (columns 2 and 3), the main difference with the previous table is that the statutory eligibility to RAMEd is now significant in urban areas (although the effect of being classified as ‘vulnerable’ is only significant at the 10% level). One interpretation of these results would be that the “early adopters” are characterized by an acute need for hospital care, as reflected by the significance of the “chronic illness” variable. This could be the result of self-selection, as well as a “top of the pile” effect (officials treating in priority the files for which the need for health care is greatest).

Results for the whole period under consideration (i.e. studying the determinants of affiliating at any time between 2012 and 2015) are shown in table 2.C.1 in the appendix, and are mostly consistent with both sets of determinants, and reflect need as well as theoretical eligibility and ability to pay.

## 2.7.2 Consultation

Our first outcome under consideration is access to health care, as measured by consultation at the household level. We start by considering all types of consultation, measured by a dummy variable at the household level. The estimates of our panel difference-in-difference propensity score matching specification are displayed in table 2.8, for the two sub-periods (2012-2013 and 2013-2015). As usual, we present estimates at the national, urban and rural level. The matching is done through gaussian kernel with a bandwidth of 0.2.

For the first entrants (columns 1 to 3), the diff-in-diff coefficient is positive and significant. The magnitude is important, corresponding to a +0.11 probability of having any type of consultation at the household level. The effect is stronger in cities (+0.17) than in rural areas (+0.09). However, the high magnitude of the diff-in-diff coefficient comes from the degradation of the outcome for the comparison group between 2012 and 2013: for this group, the probability of having any consultation goes down by 12 percentage points nationally (-0.12 in rural areas and -0.16 in urban areas).

For the households gaining access to RAMEd in 2013-2015 (left panel of table 2.8), the size of the difference-in-difference is lower than in 2012-2013, but the coefficients are still significant at the national level (+0.05) as well as for rural areas (+0.07). In urban areas the diff-in-diff coefficient is positive, but no longer statistically significant. Compared to the previous time period, the time effect is still negative, but of a lower magnitude, and does not reach significance in rural areas.

**Table 2.8** – Matching Diff-in-Diff : consultation (0/1), by residency and time period

|              | 2012-2013              |                       |                       | 2013-2015               |                       |                       |
|--------------|------------------------|-----------------------|-----------------------|-------------------------|-----------------------|-----------------------|
|              | (1)<br>national        | (2)<br>rural          | (3)<br>urban          | (4)<br>national         | (5)<br>rural          | (6)<br>urban          |
| year 2013    | -0.120***<br>(0.00921) | -0.117***<br>(0.0112) | -0.164***<br>(0.0122) |                         |                       |                       |
| RAMED        | 0.0307*<br>(0.0168)    | 0.00642<br>(0.0190)   | 0.0145<br>(0.0211)    |                         |                       |                       |
| year 2015    |                        |                       |                       | -0.0255***<br>(0.00886) | -0.0112<br>(0.0152)   | -0.0309**<br>(0.0136) |
| RAMED        |                        |                       |                       | 0.00535<br>(0.0136)     | 0.0264<br>(0.0214)    | 0.000931<br>(0.0185)  |
| Diff-in-Diff | 0.112***<br>(0.0225)   | 0.0945***<br>(0.0247) | 0.172***<br>(0.0331)  | 0.0501***<br>(0.0167)   | 0.0724***<br>(0.0279) | 0.0218<br>(0.0269)    |
| constant     | 0.393***<br>(0.00674)  | 0.344***<br>(0.00908) | 0.490***<br>(0.0107)  | 0.274***<br>(0.00545)   | 0.220***<br>(0.0106)  | 0.309***<br>(0.00863) |
| Observations | 13826                  | 5714                  | 8086                  | 11788                   | 4710                  | 7067                  |

Standard errors in parentheses

\* p&lt;0.1, \*\* p&lt;0.05, \*\*\* p&lt;0.01

bootstrapped standard errors (50 replications)

**Public vs. private** The RAMED card allows its holder to be treated for free at public facilities. Any increased demand might thus come from two distinct channels (Hangoma, Robberstad, and Aakvik, 2018): an ‘uptake effect’, corresponding to an increased overall use of health care, and a ‘switching’ effect coming from a shift in healthcare demand from private to public facilities. To discriminate between these two possible mechanisms, we run our regression separately for private and public facilities. A negative sign on the latter would be consistent with patients switching from private to public facilities.

The results of our diff-in-diff PSM specification are presented in table 2.9 and 2.10. For the ‘early adopters’ (2012-13), the effect of RAMED is positive and significant for both public and private facilities (+8.3 p.p. for public and +3.2 p.p. for private) at the national level. When segmenting by residency, the diff-in-diff coefficient for public facilities remains positive and significant for both areas; regarding private facilities, the significance persists only in cities. This result may be explained by the fact that, *de jure*, patients wishing to access inpatient care at specialist hospitals need to be referred by first-line facilities (*dispensaires*) or by a GP. In this regard, private consultation is a complement, more than a substitute, to consultation at public facilities.

The results for the second wave of RAMED adherents are presented in table 2.10. The effect of RAMED on consultations in private facilities is still positive, but no longer significant. The effect on consultations in the public sector is positive everywhere, but



**Table 2.9** – Matching Diff-in-Diff : consultation by sector, 2012-2013

|              | national                |                         | rural                   |                         | urban                   |                         |
|--------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|              | (1)<br>public           | (2)<br>private          | (3)<br>public           | (4)<br>private          | (5)<br>public           | (6)<br>private          |
| year 2013    | -0.0496***<br>(0.00742) | -0.0764***<br>(0.00720) | -0.0364***<br>(0.00950) | -0.0697***<br>(0.00900) | -0.0592***<br>(0.00998) | -0.0818***<br>(0.00934) |
| RAMED        | 0.0579***<br>(0.0146)   | -0.0256*<br>(0.0132)    | 0.0233<br>(0.0187)      | 0.00116<br>(0.0205)     | 0.108***<br>(0.0249)    | -0.0412**<br>(0.0176)   |
| Diff-in-Diff | 0.0832***<br>(0.0219)   | 0.0324**<br>(0.0137)    | 0.0823***<br>(0.0271)   | -0.00293<br>(0.0268)    | 0.0796**<br>(0.0371)    | 0.0691**<br>(0.0276)    |
| constant     | 0.183***<br>(0.00574)   | 0.219***<br>(0.00480)   | 0.150***<br>(0.00768)   | 0.184***<br>(0.00665)   | 0.208***<br>(0.00711)   | 0.243***<br>(0.00644)   |
| Observations | 13826                   | 13826                   | 5714                    | 5714                    | 8086                    | 8086                    |

bootstrapped standard errors in parentheses (50 replications)

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

significant only at the national level (at the 1% threshold) as well as in rural areas, albeit at the 10% threshold. Estimates over the entire period (2012-2015), presented in the table 2.C.4 in the appendix, are consistent with these results: the entire effect of RAMED comes from rural areas (+6.1 p.p), the diff-in-diff effect in urban areas being small and insignificant. There is no strong evidence for ‘switching’ from private to public facilities, which can be taken as an indicator of the relevance of the policy: in rural areas, demand for health care was indeed being held back by user fees in public hospitals.

Overall, these results are consistent with a gradual congestion of hospital facilities with the scaling up of RAMED. The lack of any significant effect of a removal of user fees on healthcare demand can be explained by supply-side constraints; the fact that we observe an effect only in the first period, during the scaling up of the program, when the number of affiliated households was still small, backs this hypothesis up.

**Ambulatory vs. hospital care** The RAMED card allows households and individuals covered to access hospital care for free. Basic health care was already provided for free at community health centers and dispensaries. However, their spread over the territory is uneven and the quality of care is heterogeneous (Chauffour, 2017; Ministère de la Santé, 2013). Moreover, at least in cities, patients have the option to visit private practitioners, either in private practices or clinics. As a way of checking that the effects that our models capture is really the effect of the removal of user fees, we examine the differential effect of accession to RAMED on outpatient care vs. hospital care. Outpatient care included consultations at private practices, clinics, community health centers and dispensaries. Due to data limitations, we are not able to distinguish between outpatient

**Table 2.10** – Matching Diff-in-Diff : consultation by sector, 2013-2015

|              | national                |                       | rural                 |                       | urban                   |                        |
|--------------|-------------------------|-----------------------|-----------------------|-----------------------|-------------------------|------------------------|
|              | (1)<br>public           | (2)<br>private        | (3)<br>public         | (4)<br>private        | (5)<br>public           | (6)<br>private         |
| year 2015    | -0.0429***<br>(0.00822) | -0.0102*<br>(0.00608) | -0.0132<br>(0.00882)  | -0.00570<br>(0.0110)  | -0.0390***<br>(0.00914) | -0.000676<br>(0.0106)  |
| RAMED        | 0.0271**<br>(0.0126)    | -0.0246**<br>(0.0106) | 0.0458***<br>(0.0167) | -0.0111<br>(0.0139)   | 0.0448**<br>(0.0182)    | -0.0422***<br>(0.0144) |
| Diff-in-Diff | 0.0524***<br>(0.0168)   | 0.0197<br>(0.0149)    | 0.0397*<br>(0.0212)   | 0.0289<br>(0.0226)    | 0.0329<br>(0.0259)      | -0.00238<br>(0.0201)   |
| constant     | 0.141***<br>(0.00651)   | 0.142***<br>(0.00515) | 0.103***<br>(0.00833) | 0.119***<br>(0.00662) | 0.141***<br>(0.00697)   | 0.169***<br>(0.00672)  |
| Observations | 11788                   | 11788                 | 4710                  | 4710                  | 7067                    | 7067                   |

bootstrapped standard errors in parentheses (50 replications)

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

and inpatient care at the hospital level.

**Table 2.11** – Matching Diff-in-Diff : consultation by type, 2012-2013

|              | national                |                         | rural                  |                         | urban                  |                         |
|--------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
|              | (1)<br>outpatient       | (2)<br>hospital         | (3)<br>outpatient      | (4)<br>hospital         | (5)<br>outpatient      | (6)<br>hospital         |
| year 2013    | 0.000579<br>(0.00115)   | -0.0383***<br>(0.00561) | 0.00126<br>(0.000937)  | -0.0331***<br>(0.00982) | 0.000233<br>(0.00191)  | -0.0425***<br>(0.00808) |
| RAMED        | -0.00865**<br>(0.00379) | 0.0537***<br>(0.0142)   | -0.00636<br>(0.00460)  | 0.0317*<br>(0.0171)     | -0.0119**<br>(0.00573) | 0.0865***<br>(0.0189)   |
| Diff-in-Diff | -0.000579<br>(0.00472)  | 0.0425**<br>(0.0170)    | 0.00277<br>(0.00462)   | 0.0268<br>(0.0272)      | -0.00467<br>(0.00922)  | 0.0584**<br>(0.0275)    |
| constant     | 0.996***<br>(0.000834)  | 0.147***<br>(0.00483)   | 0.998***<br>(0.000876) | 0.121***<br>(0.00802)   | 0.994***<br>(0.00140)  | 0.166***<br>(0.00582)   |
| Observations | 13826                   | 13826                   | 5714                   | 5714                    | 8086                   | 8086                    |

bootstrapped standard errors in parentheses (50 replications)

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

The results of the diff-in-diff PSM for the first period (2012-2013) are displayed in table 2.11. At the national level, the diff-in-diff coefficient is positive and significant for hospital care; it is negative and insignificant for outpatient care. By residency, the diff-in-diff coefficient for outpatient care is positive in urban and rural areas, but significant only in urban areas. There is no evidence of a substitution of hospital care for outpatient care. Notice that the RAMED households were already more likely to consult at hospitals before the scheme was put in place, as evidenced by the coefficient of the ‘RAMED’ variable, which captures pre-treatment differences between treated and controlled.

The results for the second period (2013-2015) are summarized in table 2.12. At the national level, the diff-in-diff coefficient is not significant for either type of consultation. At the subnational level, the diff-in-diff is not significant for either type of consultation in urban areas; only in rural is there a positive impact on consultation at public hospitals (+3.8 p.p.), the latter being only significant at the 10% level.

Over the entire period (2012-2015) (cf. table 2.C.5 in appendix), getting access to a RAMED card does not have any significant effect on the probability of consulting at a hospital facility at the national level. In rural areas, access to RAMED is significantly linked with a higher probability of having any hospital consultation at the household level (+4.1 p.p.). In cities, the coefficient for hospital care is negative over the whole period (-3.4 p.p.), significant at the 10% level.

**Table 2.12** – Matching Diff-in-Diff : consultation by type, 2013-2015

|              | national               |                         | rural                    |                        | urban                 |                         |
|--------------|------------------------|-------------------------|--------------------------|------------------------|-----------------------|-------------------------|
|              | (1)<br>outpatient      | (2)<br>hospital         | (3)<br>outpatient        | (4)<br>hospital        | (5)<br>outpatient     | (6)<br>hospital         |
| year 2015    | 0.000368<br>(0.000908) | -0.0304***<br>(0.00593) | -0.0000228<br>(0.000770) | -0.0216**<br>(0.00906) | 0.000455<br>(0.00199) | -0.0348***<br>(0.00812) |
| RAMED        | -0.000715<br>(0.00177) | 0.0215**<br>(0.0104)    | 0.000597<br>(0.000579)   | 0.0285**<br>(0.0145)   | -0.00267<br>(0.00421) | 0.0215<br>(0.0149)      |
| Diff-in-Diff | -0.000368<br>(0.00247) | 0.0161<br>(0.0156)      | -0.00329<br>(0.00216)    | 0.0381*<br>(0.0209)    | 0.00260<br>(0.00544)  | -0.00791<br>(0.0146)    |
| constant     | 0.997***<br>(0.000705) | 0.106***<br>(0.00418)   | 0.999***<br>(0.000579)   | 0.0824***<br>(0.00638) | 0.995***<br>(0.00145) | 0.120***<br>(0.00585)   |
| Observations | 11788                  | 11788                   | 4710                     | 4710                   | 7067                  | 7067                    |

bootstrapped standard errors in parentheses (50 replications)  
 \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Overall, the results presented in this section point towards a positive, albeit modest, effect of RAMED on access to hospital care (and to health care in general) for populations that previously didn't have access to any form of coverage. The effect is greatest in the time period immediately after the inauguration of the scheme, when the numbers of adherents was still relatively modest; over the whole period, it is significantly different from zero only for rural residents. Our results imply that user fees were a real barrier to health care access for rural residents. This is all the more likely to be the case, that the density of medical services is much lower in rural areas compared to cities. The contrast between the strong effect of RAMED on its adopters in cities in 2012-13 and its insignificance afterwards may reflect congestion effects due to capacity constraints.

### 2.7.3 Health expenditures

The objective of the universal health care (UHC) agenda is to provide health care to all without causing financial hardship. In this section, we examine the effect of gaining access to ‘free’ health care on health expenditures at the household level. In theory, the effect of a removal of user fees is ambiguous, if households are liquidity constrained pre-program. Having access to hospital care free of charge may diminish the financial burden of households due to health care; but on the other hand, the overall spending on health care may increase if some households had previously zero expenditure on health care due to lack of access. This is especially likely to be the case if there are ancillary costs linked to hospital care (for example transport costs or the opportunity costs linked with having one person accompany the sick for time of his treatment), if gratuity is incomplete or if there are informal payments to medical practitioners (Ensor, 2004; Wagstaff and Lindelow, 2008). Such mechanisms may be at play in the case of Morocco, especially after RAMED was put in place: interviews with medical professionals in the public sector have reported hospitals have faced increased inventory shortages, especially on consumables and medical supplies, after the introduction of the fee waiver, forcing them in some cases to ask the patients to purchase themselves some drugs or medical supplies on the private market (ONDH, 2017).

We use various indicators of the financial burden of health to estimate the effect of RAMED on health expenditures at the household level. First, we build a dummy equal to one if the household has had any health expenditure over the reference period; second, we take the quartic root of total per capita health expenditure as an indicator of unconditional expenditure on health (the quartic root transformation is used to deal with the right-skewed nature of health expenditures); third, we use the natural logarithm of total per capita health expenditure as an indicator of conditional health expenditures (i.e. conditional on the household having positive health expenditures), as the transformation eliminates all households with zero expenditure on health; finally, we use the budget share of health in total household consumption, which is an indicator of the financial burden supported by households due to health. As usual, we run our estimations by sub-periods and for rural and urban households separately.

The results at the national level are displayed in table 2.13. Over the 2012-2013 interval (left panel), the effect of RAMED is positive but generally not statistically significant, except for unconditional expenditures where the effect is significant at the 10% threshold. The coefficient of 0.26 corresponds to a difference in health expenditure per person of around 33 DH, or approximately 3 USD. Over the next interval (right panel), the effect of accessing RAMED is also generally not significant, except for the conditional expenditures, where it is negative and significant at the 10% threshold.

**Table 2.13** – Matching Diff-in-Diff : Health expenditures, national

|              | 2012-2013             |                      |                       |                       | 2013-2015              |                       |                      |                       |
|--------------|-----------------------|----------------------|-----------------------|-----------------------|------------------------|-----------------------|----------------------|-----------------------|
|              | (1)<br>any exp (0/1)  | (2)<br>p. cap. (qtr) | (3)<br>p. cap. (ln)   | (4)<br>budg share (%) | (5)<br>any exp (0/1)   | (6)<br>p. cap. (qtr)  | (7)<br>p. cap. (ln)  | (8)<br>budg share (%) |
| year 2013    | 0.126***<br>(0.00832) | 0.314***<br>(0.0526) | -0.270***<br>(0.0281) | 0.864***<br>(0.137)   |                        |                       |                      |                       |
| RAMED        | 0.0299<br>(0.0183)    | 0.0732<br>(0.108)    | -0.0983<br>(0.0605)   | 1.206***<br>(0.356)   |                        |                       |                      |                       |
| year 2015    |                       |                      |                       |                       | -0.192***<br>(0.00822) | -0.562***<br>(0.0536) | 0.598***<br>(0.0392) | -0.479***<br>(0.176)  |
| RAMED        |                       |                      |                       |                       | 0.00547<br>(0.0148)    | -0.0127<br>(0.0799)   | -0.0402<br>(0.0572)  | 0.819***<br>(0.294)   |
| Diff-in-Diff | 0.0296<br>(0.0240)    | 0.264*<br>(0.135)    | 0.0341<br>(0.0893)    | 0.764<br>(0.514)      | 0.0272<br>(0.0238)     | 0.107<br>(0.0989)     | -0.163*<br>(0.0958)  | 0.733<br>(0.471)      |
| constant     | 0.620***<br>(0.00669) | 3.306***<br>(0.0390) | 6.439***<br>(0.0248)  | 9.746***<br>(0.119)   | 0.741***<br>(0.00586)  | 3.600***<br>(0.0388)  | 6.071***<br>(0.0282) | 10.42***<br>(0.123)   |
| Observations | 13826                 | 13826                | 8762                  | 13826                 | 11788                  | 11788                 | 7157                 | 11788                 |

bootstrapped standard errors in parentheses (50 replications)

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

The results by residency over the whole time frame (2012-2015) are displayed in table 2.14. In rural areas (left panel), the effects are not significantly different from zero for all dependent variables. In urban areas (right panel), the diff-in-diff coefficient is significantly different from zero only for conditional health expenditures (column 7): for the households who have had health expenditures in both survey waves, accession to RAMED is associated with a sizable reduction in total health expenditures (approximately -20% compared to previous wave). Detailed results by subperiods, shown in tables 2.C.6 and 2.C.7 in the appendix, show that this comes mainly from the latter period.

### **2.7.4 Covariate balance and common support**

To summarize, the effect of RAMED on the household's financial burden linked to health appear to be modest, not to say mostly nonexistent. However, these results are consistent with the picture painted by the previous section on access to health care, which implied that user fees were a binding constraint to health care access in rural areas only, which is consistent with the fact that we do not witness a reduction in health care expenditure in those parts of the country. On the contrary, in urban areas, where the effect of RAMED on access was weaker, those households that had a great need for health care may have seen their financial burden lightened, as witnessed by the negative coefficient on conditional health expenditures.

## **2.8 Conclusion and discussion**

In the past two decades, an opposition has crystallized in policy circles between the “safety nets” agenda, mainly promoted by the IMF and the World Bank, and the advocacy of a broader “social rights” approach, supported by institutions such as the ILO. Broadly speaking, “safety nets” designate programs that are non-contributory, and that aim at protecting the poorest household from the negative consequences of shocks (Grosh et al., 2008). Example of such programs are cash and in-kind transfers (conditional or not), price subsidies, workfare programs, and fee waivers on essential services. The two criteria that distinguish social safety nets from the broader concept of social protection is their non-contributory nature (hence, social insurance schemes are excluded), and, in practice if not in theory, the presence of some sort of targeting to minimize the financial costs of attaining a given social target. By contrast, the broader “rights” agenda puts the emphasis on social protection, universality of benefits, and overall distributional consequences of social programs: inequality reduction is at the forefront of the “rights” agenda,

**Table 2.14** – Matching Diff-in-Diff : Health expenditures, 2012-2015, by residency

|              | rural                 |                      |                      |                       | urban                 |                       |                      |                       |
|--------------|-----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|
|              | (1)<br>any exp (0/1)  | (2)<br>p.cap.(qtr)   | (3)<br>p.cap.(ln)    | (4)<br>budg share (%) | (5)<br>any exp (0/1)  | (6)<br>p.cap.(qtr)    | (7)<br>p.cap.(ln)    | (8)<br>budg share (%) |
| year 2015    | -0.0175<br>(0.0153)   | -0.0614<br>(0.0883)  | 0.107<br>(0.0676)    | 0.940***<br>(0.293)   | -0.123***<br>(0.0138) | -0.477***<br>(0.0832) | 0.416***<br>(0.0574) | -0.126<br>(0.247)     |
| RAMED        | 0.0440***<br>(0.0188) | 0.271**<br>(0.113)   | 0.0617<br>(0.0800)   | 1.524***<br>(0.378)   | 0.0105<br>(0.0167)    | -0.0474<br>(0.112)    | -0.107<br>(0.0669)   | 0.961***<br>(0.316)   |
| Diff-in-Diff | 0.0381<br>(0.0242)    | 0.241<br>(0.164)     | -0.0148<br>(0.104)   | 0.449<br>(0.513)      | 0.00890<br>(0.0232)   | 0.000321<br>(0.185)   | -0.204**<br>(0.0975) | 0.158<br>(0.516)      |
| constant     | 0.561***<br>(0.0110)  | 2.690***<br>(0.0629) | 6.037***<br>(0.0431) | 7.686***<br>(0.177)   | 0.660***<br>(0.0102)  | 3.715***<br>(0.0455)  | 6.649***<br>(0.0315) | 11.18***<br>(0.219)   |
| Observations | 5634                  | 5634                 | 2810                 | 5634                  | 7589                  | 7589                  | 4121                 | 7589                  |

bootstrapped standard errors in parentheses (50 replications)

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

while the foremost concern for the “social safety nets” agenda is concerned mainly with poverty reduction.

One of the policies that has gained traction in the previous decade is the removal of user fees for health services. Several African countries have reversed the policies of cost recovery that had been implemented in the 1990s as part of the structural adjustment programs, due to internal political dynamics as well as the perceived adverse social consequences of those policies (Meessen et al., 2011).

In this article, we study one original example of such a policy: a targeted user fee exemption for hospital care, put in place in Morocco in 2012. This policy, called RAMED (*Régime d'Assistance Médicale*), is original in that the gratuity concerns hospital care, primary care being already free in a network of dispensaries located across the country. Another distinctive characteristic is that RAMED makes use of a proxy means test to target the poorest quartile in the country.

This policy gives us a unique opportunity to test the merits of the social safety net approach in an original, and understudied context. A lower middle-income country, Morocco is characterized by good overall health indicators, but great inequality in access to healthcare. It is thus not a foregone conclusion that removing user fees will lead to higher overall health care demand. Indeed, compared to other constraints such as a limited supply of good quality care, user fees may not be the biggest constraint faced by poor households, which would explain a low overall effect. Another issue is that an observed increase in consultations following the introduction of the policy may simply reflect a demand shift from private to public health care, or from first line facilities (community health centers and dispensaries) to public hospitals.

**Summary of the results** This paper makes use of a nationally representative household panel data sets that covers the period just before the introduction of the policy, during its ramp-up, and after the roll-out. We combine a propensity score matching and a panel difference-in-differences specification to construct a suitable counterfactual for the households that have accessed RAMED, in order to neutralize selection bias coming from observed and time-invariant unobserved characteristics.

Regarding selection, our main results are that effective affiliation to RAMED reflects not only the theoretical eligibility to the scheme, but also health care need and the ability to pay of households. This is consistent with self-selection by households, but it is also points towards an active role of public officials in giving access to some households that may not strictly comply with (outdated and overly sensitive) eligibility criteria. On this matter, the situation differs between urban and rural areas: as criteria differ between these two areas, and are more stringent for rural areas, the theoretical eligibility appears



to be more binding for inhabitants of the countryside. By contrast, theoretical eligibility appears to be less binding in cities, with other covariates related to living standards such as the number of children, female-headed households, and education appearing as important determinants of affiliation to RAMED. This is consistent with the literature on decentralized targeting of public benefits that shows that local officials sometimes act on the knowledge they have of the constituents' real living conditions (Alderman, 2002; Mansuri and Rao, 2004).

On the issue of health care demand, our result differ strongly according to the time interval under consideration (i.e. during the ramp-up or after the extension), and according to residency (rural or urban). In the time period just after the inauguration, the result of our estimations point toward a very strong effect of the fee waiver on health care demand, especially in urban areas. For the subsequent time period (as well as over the entire time interval under consideration), the effect of RAMED is significant only for rural areas. We interpret this as evidence that user fees were, in fact, a binding constraint for health care demand for rural households. Moreover, we do not find any evidence of any shift in demand between private and public providers, nor between first-line facilities and hospitals. For rural households at least, free health care seems to be a step in the direction of universal health coverage.

The results are more subdued regarding the financial burden of health care. To the extent that there is an effect of RAMED hospital fee waiver, it is limited to the conditional health expenditures of urban households: those who had a regular health care demand, for instance due to chronic disease, have experienced a reduction in their health expenditure. In rural areas, there are few significant effects of RAMED on financial indicators, one exception being a positive coefficient of small magnitude on the budget share devoted to health in the latter time period (2013-2015). This result is consistent with the previous conclusion that it is mainly poor rural households that faced financial barriers to health care.

**Discussion** The results presented here suffer from several weaknesses. As with any difference-in-difference study, the interpretation of the results as the average effect of the treatment on the treated (ATT) rests on an untestable parallel trend assumption. In our case, there is some doubt as to suitability of this assumption in the case of early adopters (those who have acceded to RAMED in the first months of the program, in 2012-2013). Firstly, the time coefficient in our model is negative and very large; this is what actually drives the result for the first time period. While we have documented in section 2.6 that there is a general downward trend in consultation rate (even for categories of households who are *a priori* not subject to any of the effects under study here, namely those who

benefit from a proper health insurance), there is still reason to doubt. The large effect displayed in the first time period may also be biased, due to the possibility of “pent-up demand”. This refers to the fact that, for some type of illnesses, the individual has some degree of choice as to the timing of the medical intervention, should he need one. Hence, some of the healthcare that occurs just after gaining access to an insurance policy may reflect delayed interventions, rather than the causal effect of the policy. This phenomenon has been extensively studied in other contexts (cf. Card, Dobkin, and Maestas, 2009; Franc, Perronnin, and Pierre, 2016), but without more detail on individual health conditions, we are not able to control for this phenomenon. For this reason, we put more trust in the estimates covering longer time intervals (i.e. the estimates between 2012 and 2015 or between 2013 and 2015).

Another issue that threatens the causal interpretation of our results is the possibility of congestion effects. Qualitative studies as well informal discussions with members of the medical community reflect the perception that RAMED has led to a saturation of hospital infrastructure from the increased demand, and a flight to the private sector of solvent patients (ONDH, 2017). This is a problem for our estimation, because it amounts to a violation of the “stable unit treatment value assumption” (SUTVA), which requires that there is no interference and no contamination of nontreated units through the treatment itself (Angrist and Pischke, 2009). Such an phenomenon would threaten the internal as well as the external validity of our results. One silver lining is that, should this ‘negative contamination bias’ be present here, it would go in the opposite direction to the bias mentioned in the previous paragraph.

Finally, to the extent that our results conclude to an increased health care demand, how much of it is due to previously unfulfilled needs, and how much of it represent moral hazard? For anybody having visited a public hospital in Morocco, the idea individuals would “over-consume” medical care just because it is free may appear doubtful. Yet the issue cannot be shrugged off, and is of particular interest to the policymaker which has to decide on the use of scarce resources to finance such a program (the total theoretical financial cost of RAMED is estimated at 0.5% of GNI, although as of date the program remains underfunded). One theoretical argument against this interpretation is the model by Nyman (2008) showing that in the case of health insurance, some of the moral hazard is actually welfare-increasing, due to inherent income transfer between the healthy and the sick that insurance program entails. But ideally, one would like to make the case against moral hazard on empirical arguments rather than on theory alone; and for this, data is lacking as well.

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# Appendices

## 2.A Targeting of RAMED

### Rural areas

#### Eligibility criteria

**Table 2.A.1** – Eligibility criteria for RAMED in rural areas:  
patrimonial score

| <b>element description</b>                | <b>points per unit</b> |
|---|------------------------|
| <i>agricultural land exploited</i>        |                        |
| 1 ha, irrigated                           | 100                    |
| 1 ha, arboricultural                      | 200                    |
| 1 ha bour (rain-fed agriculture)          | 13                     |
| <i>Livestock</i>                          |                        |
| cow                                       | 20                     |
| sheep                                     | 5                      |
| goat                                      | 4                      |
| horse                                     | 50                     |
| camel                                     | 60                     |
| <i>Poultry</i>                            |                        |
| hen/chicken                               | 0.5                    |
| <i>agricultural or transport material</i> |                        |
| harvester                                 | 600                    |
| tractor                                   | 300                    |
| van                                       | 300                    |

**eligibility limit : 70 pts/ hh member (28 pts/pers for “poor”)**

source: Interior Ministry, *Décret 2-08-177(2008) modifié* and *Arrêté 836-08 (2008)*



**Table 2.A.2** – Eligibility criteria for RAMED in rural areas: socio-economic score

| element description                       | points |
|---|--------|
| <i>personal vehicle</i>                   |        |
| none                                      | 1      |
| cycle or moped                            | 2      |
| car                                       | 3      |
| <i>number of water points in the home</i> |        |
| zero to 1                                 | 1      |
| 2 to 3                                    | 2      |
| 4 and more                                | 3      |
| <i>phone</i>                              |        |
| none or phone without contract            | 1      |
| landline only                             | 2      |
| landline only plus phone with contract    | 3      |
| <b>eligibility limit: 6 points</b>        |        |

source: Interior Ministry, *Décret 2-08-177(2008) modifié* and *Arrêté 836-08 (2008)*

**Theoretical eligibility, 2012**

**Figure 2.A.1** – Ex-ante distribution of the socio-economic score in 2012, rural

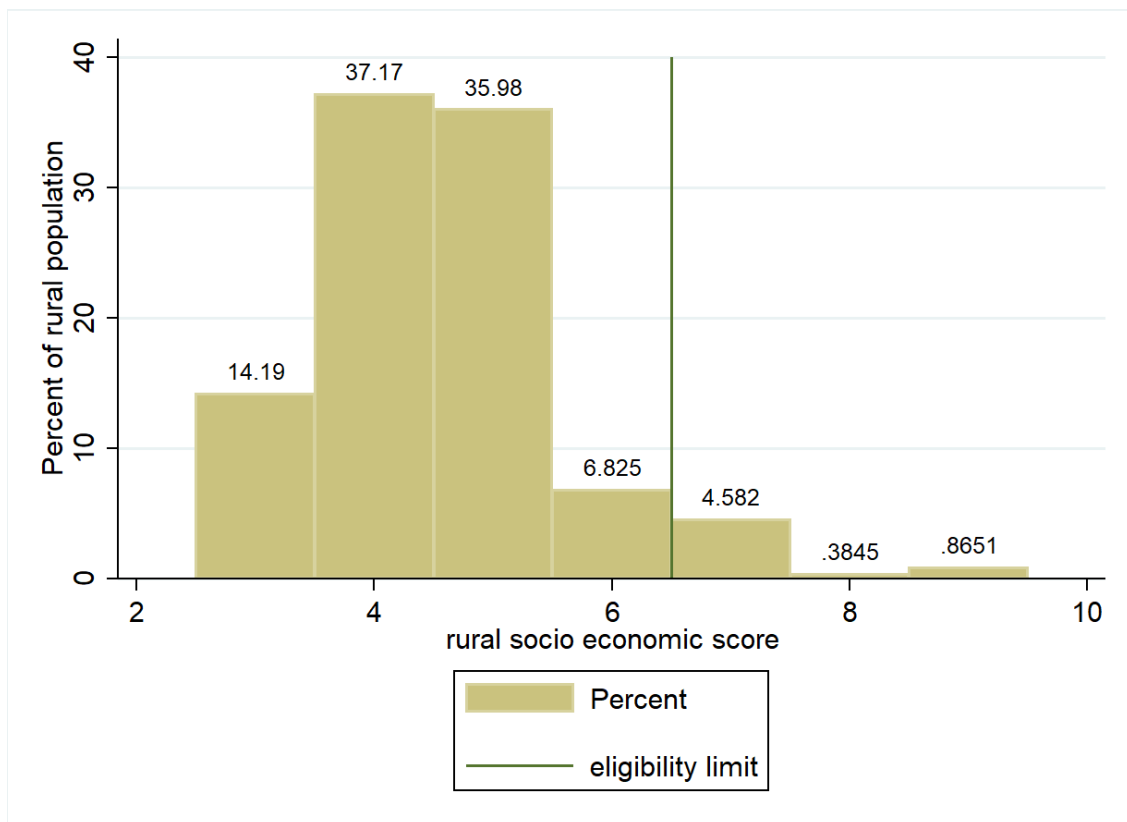
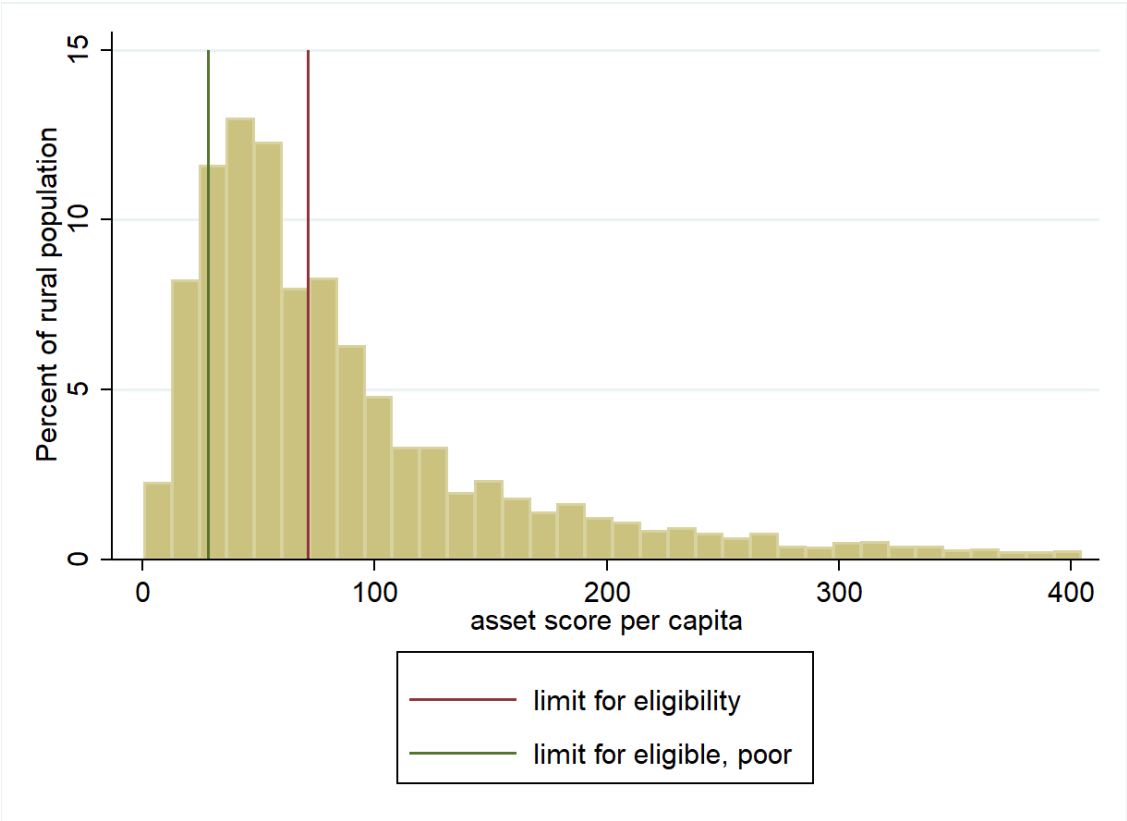
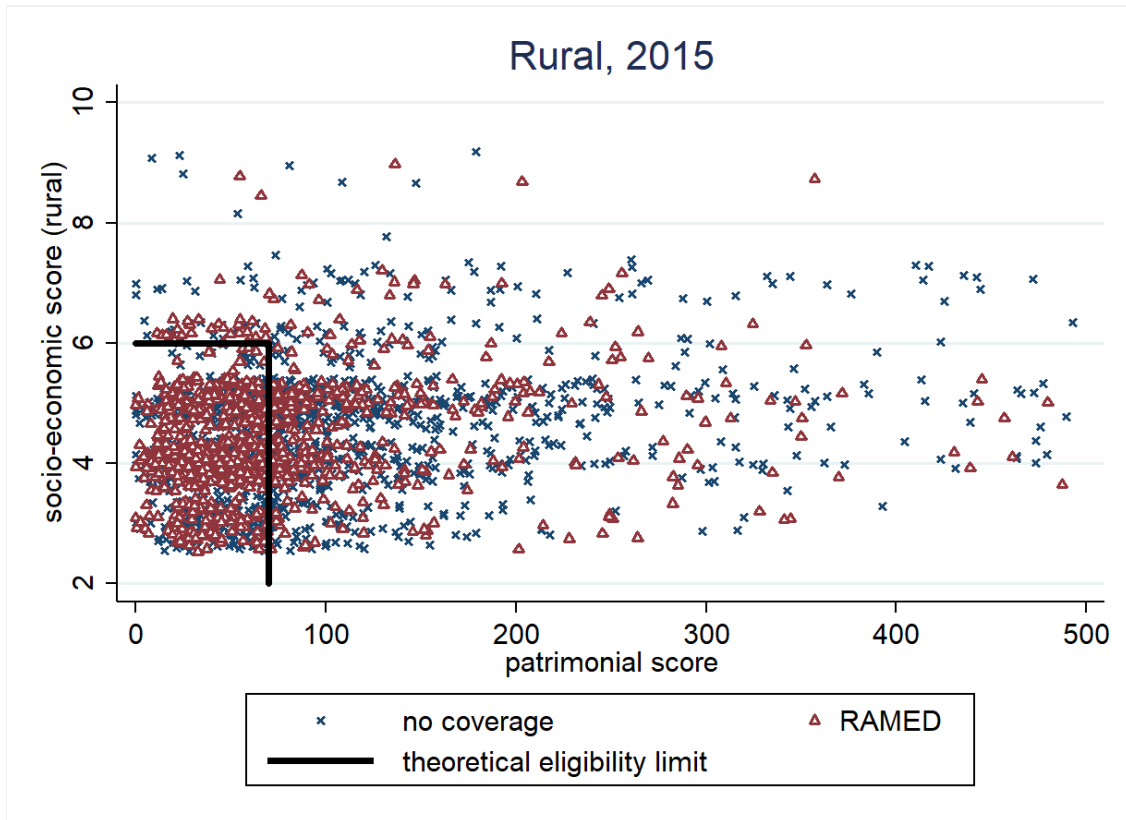


Figure 2.A.2 – Ex-ante distribution of the patrimonial score in 2012, rural



### Affiliation to RAMED as a function of eligibility criteria

Figure 2.A.3 – Affiliation to RAMED in 2015 by theoretical eligibility criteria, rural



## Urban areas

### Eligibility criteria

**Table 2.A.3** – Eligibility criteria for RAMED in urban areas:  
socio-economic score

| <b>variable description</b>                    | <b>number of points</b> |
|--|-------------------------|
| <i>number of persons per room in the house</i> |                         |
| more than 3.417                                | 1                       |
| from 2.083 to 3.417                            | 2                       |
| less than 2.083                                | 3                       |
| <i>water points</i>                            |                         |
| zero to one                                    | 1                       |
| 2 and more                                     | 2                       |
| <i>electricity</i>                             |                         |
| other means                                    | 1                       |
| collective meter                               | 2                       |
| individual meter                               | 3                       |
| <i>water access</i>                            |                         |
| no meter                                       | 1                       |
| individual or collective meter                 | 2                       |
| <i>Sewage</i>                                  |                         |
| no connection to sewage                        | 1                       |
| connection to sewage                           | 2                       |
| <i>telephone</i>                               |                         |
| none or mobile without contract                | 1                       |
| landline and/or mobile with contract           | 2                       |
| <b>eligibility limit: 11 points</b>            |                         |

source: Interior Ministry, *Décret 2-08-177(2008) modifié* and *Arrêté 836-08 (2008)*

**Table 2.A.4** – Eligibility criteria for RAMED in urban areas: weights of self-declared income

| Variable                                       | weights |
|--|---------|
| <i>number of persons per room</i>              |         |
| more than two persons                          | -0.35   |
| 1 pers/room or less                            | 1       |
| <i>amenities</i>                               |         |
| no water or electricity                        | -0.15   |
| 2 toilets or more                              | 0.3     |
| <i>personal means of transport</i>             |         |
| none   | -0.05   |
| car  | 0.2     |
| <b>eligibility limit: 5650 DH/year/pers</b>    |         |
| <b>(3767 DH/year/pers for eligible "poor")</b> |         |

source: Interior Ministry, *Décret 2-08-177(2008) modifié* and *Arrêté 836-08 (2008)*

**Theoretical eligibility, 2012**

**Figure 2.A.4** – Ex-ante distribution of the socio-economic score in 2012, urban

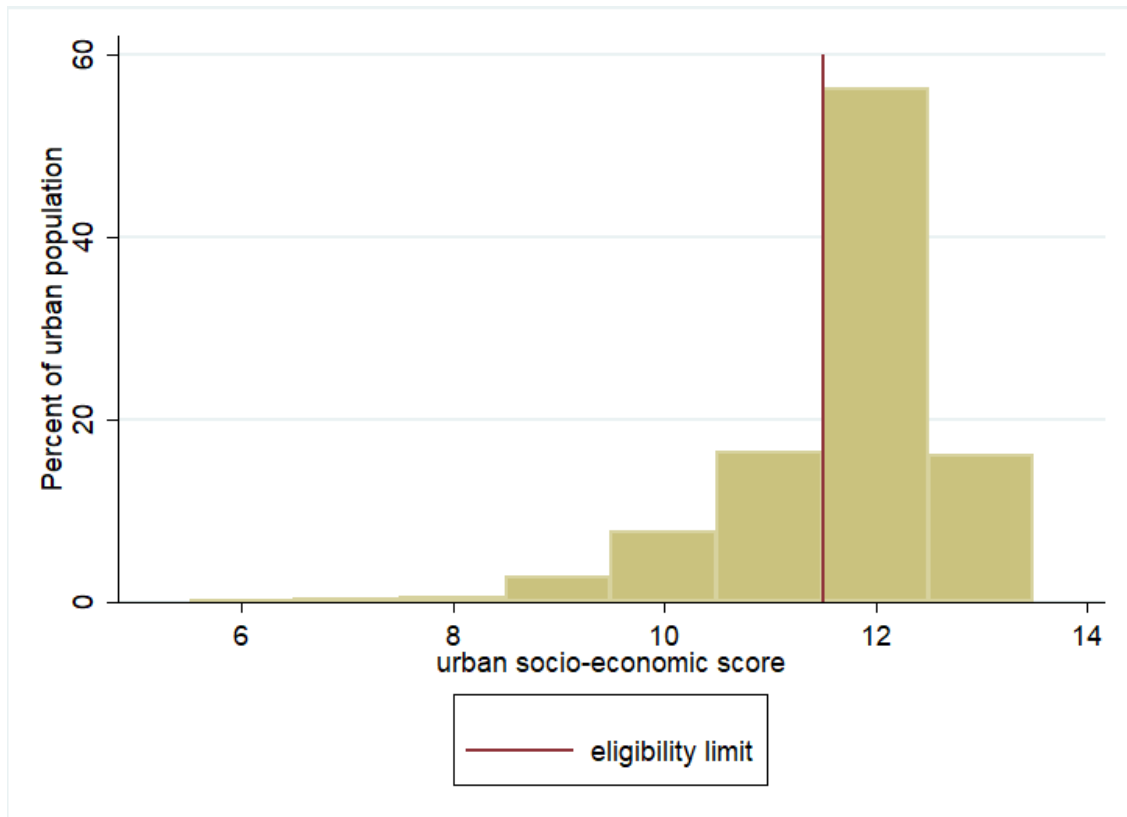
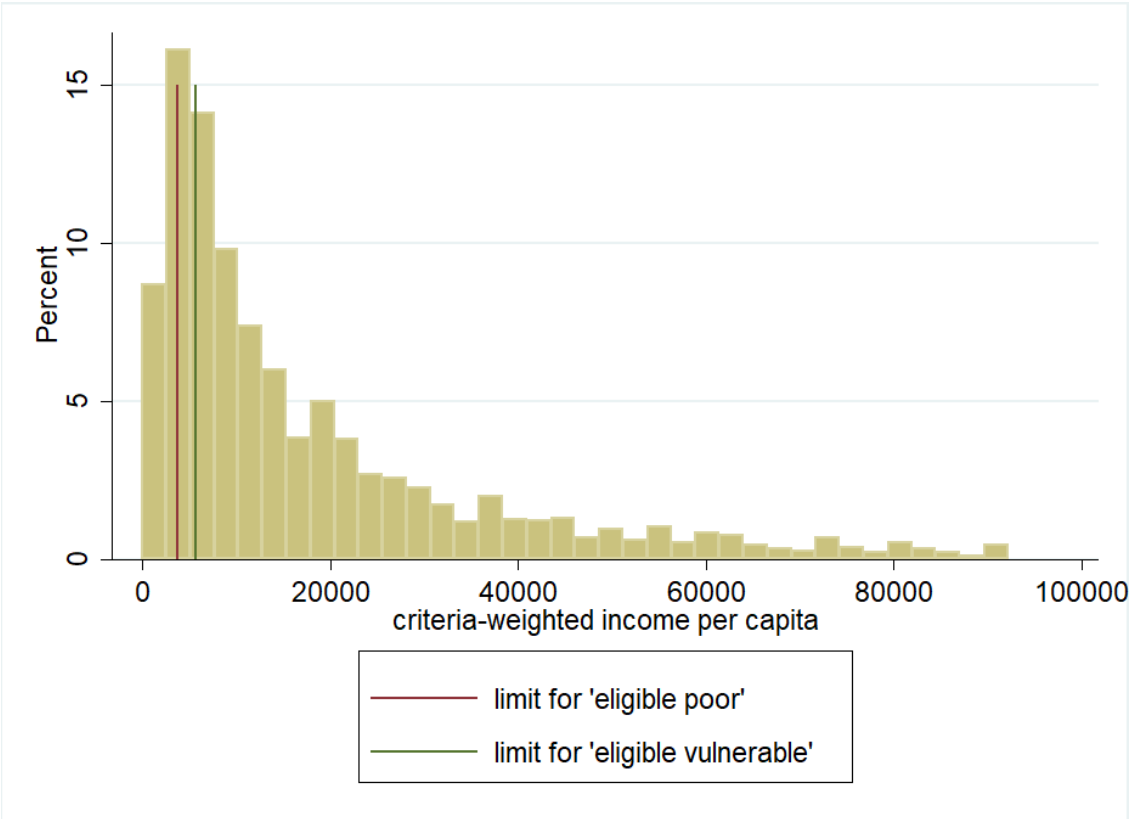
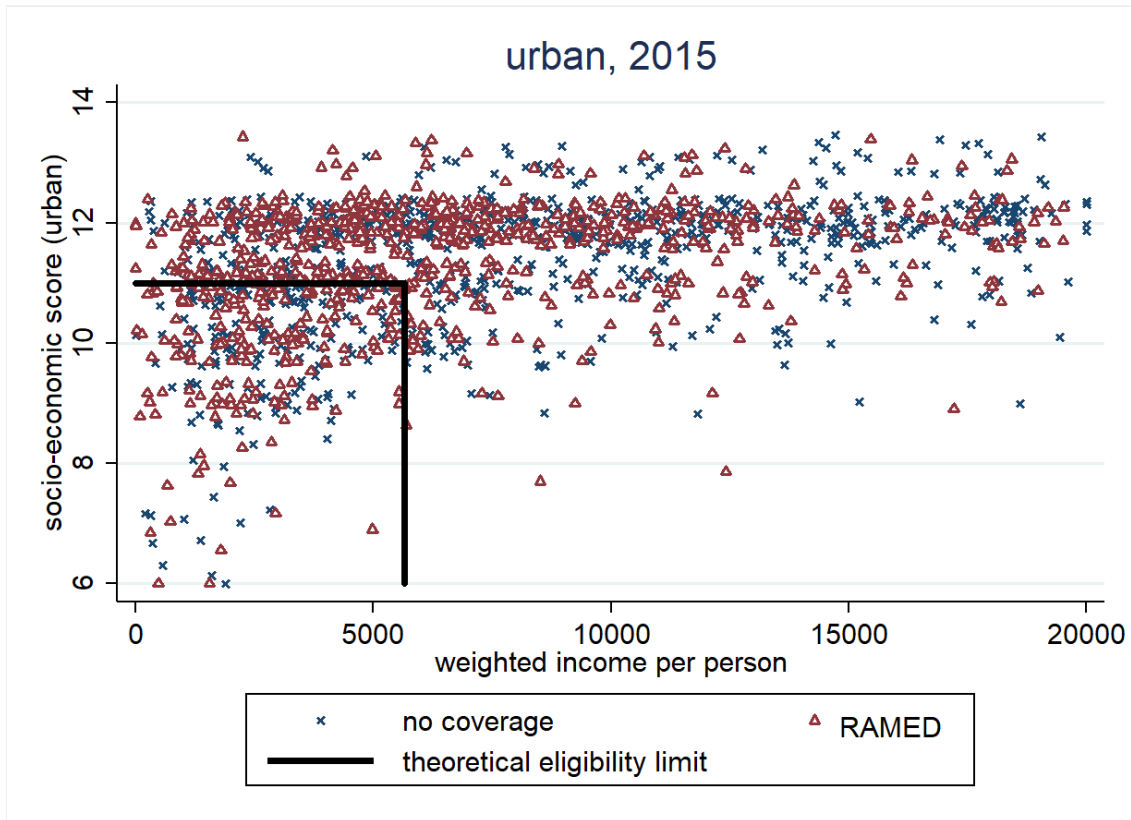


Figure 2.A.5 – Ex-ante distribution of the criteria-weighted income per capita, urban



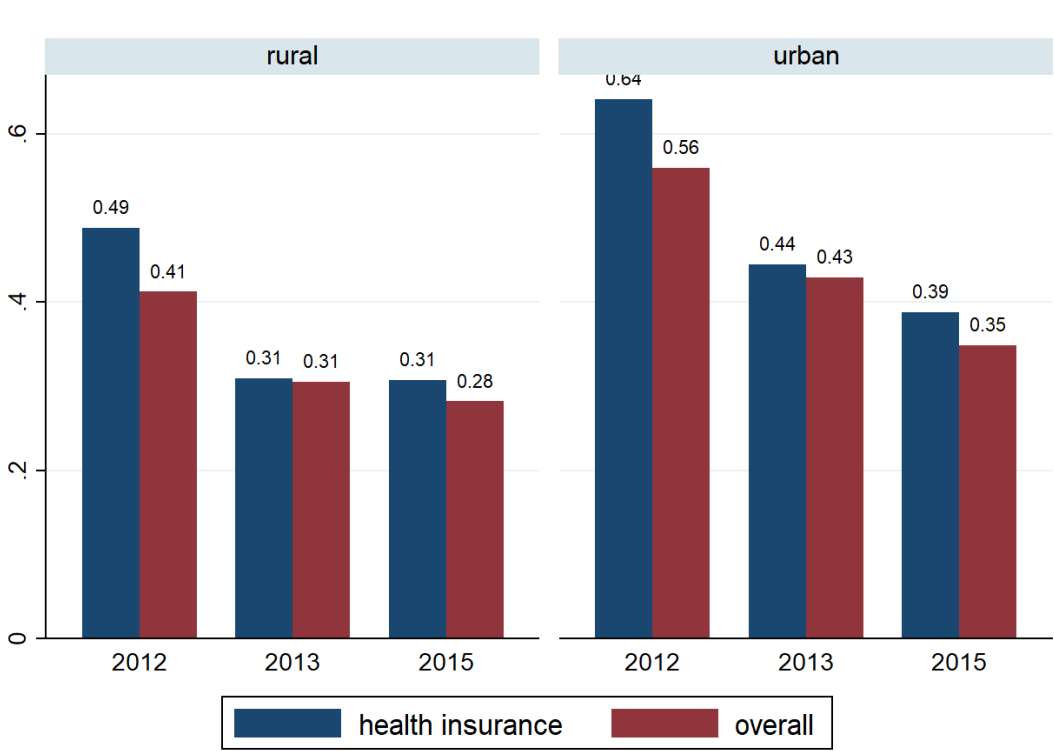
### Affiliation to RAMED as a function of eligibility criteria

Figure 2.A.6 – Affiliation to RAMED in 2015 by theoretical eligibility criteria, urban



## 2.B Additional figures

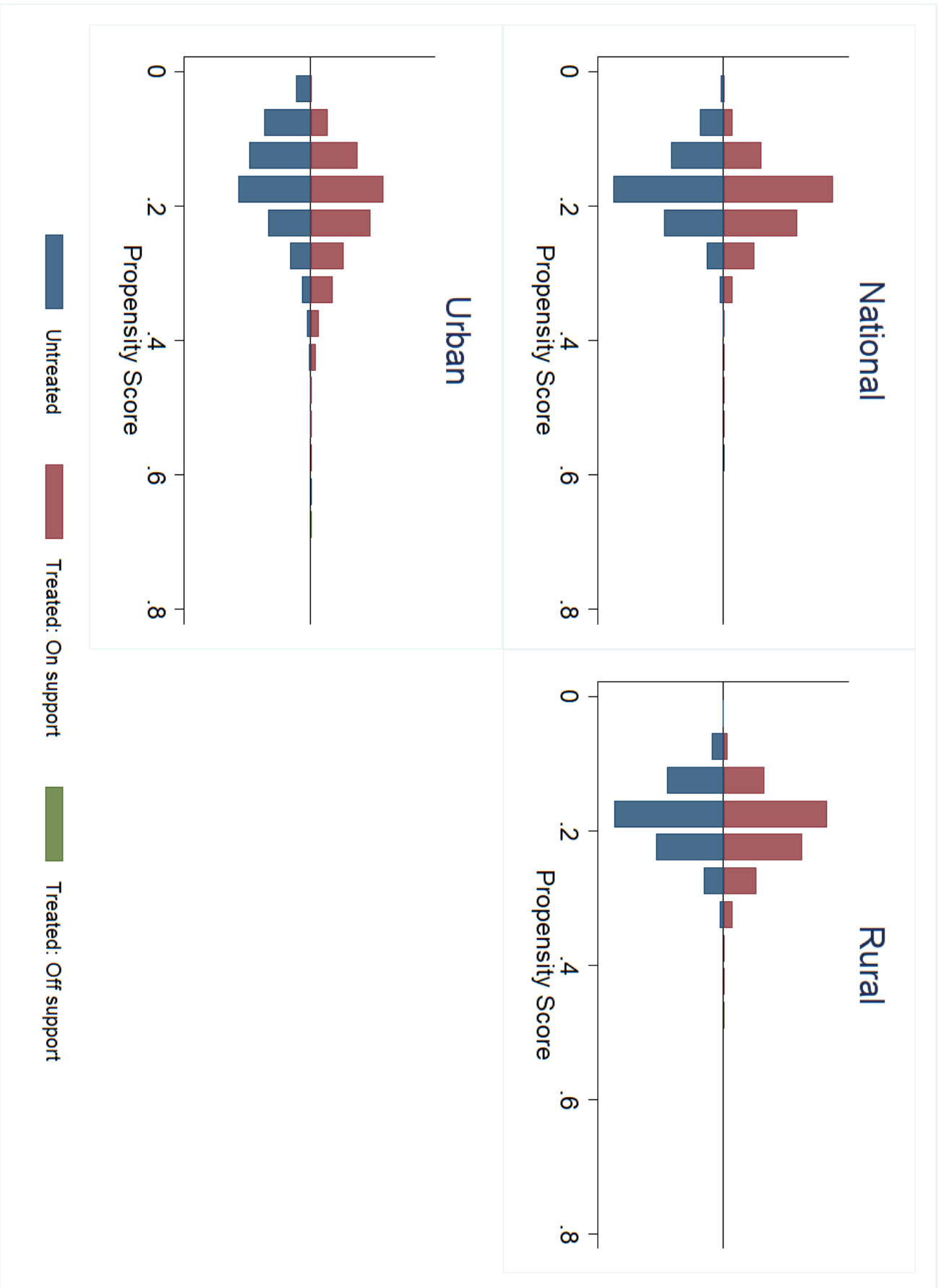
Figure 2.B.1 – Consultation rates by year and coverage type



Graphs by urban



Figure 2.B.2 – Propensity score matching: common support at baseline



## 2.C Additional tables

**Table 2.C.1** – probit model of RAMED affiliation in 2015, by residency

|                                 | (1)<br>national |         | (2)<br>rural |         | (3)<br>urban |         |
|---------------------------------|-----------------|---------|--------------|---------|--------------|---------|
| urban                           | 0.009           | (0.018) | .            | .       | .            | .       |
| age of hh head                  | 0.006**         | (0.003) | 0.003        | (0.005) | 0.009**      | (0.004) |
| square age of hh head           | -0.000**        | (0.000) | -0.000       | (0.000) | -0.000***    | (0.000) |
| female hh head                  | 0.091***        | (0.016) | 0.110***     | (0.031) | 0.078***     | (0.017) |
| <i>education of hh head</i>     |                 |         |              |         |              |         |
| primary or lower                | 0.140***        | (0.025) | 0.121*       | (0.068) | 0.139***     | (0.025) |
| lower secondary                 | 0.123***        | (0.029) | 0.083        | (0.078) | 0.127***     | (0.029) |
| higher ed.                      | -0.045          | (0.037) | 0.037        | (0.103) | -0.041       | (0.037) |
| <i>household structure</i>      |                 |         |              |         |              |         |
| household size                  | -0.009**        | (0.004) | -0.005       | (0.007) | -0.012*      | (0.006) |
| # women                         | 0.002           | (0.006) | -0.001       | (0.009) | 0.006        | (0.008) |
| # children (<6 y)               | 0.013*          | (0.007) | 0.011        | (0.011) | 0.012        | (0.010) |
| # elderly (>65 y)               | 0.009           | (0.013) | -0.017       | (0.021) | 0.025        | (0.017) |
| employment rate                 | -0.019          | (0.023) | 0.030        | (0.040) | -0.050*      | (0.027) |
| # independent                   | 0.058***        | (0.008) | 0.029**      | (0.012) | 0.085***     | (0.010) |
| <i>eligibility to RAMED</i>     |                 |         |              |         |              |         |
| eligible 'poor'                 | 0.122***        | (0.017) | 0.195***     | (0.029) | 0.064***     | (0.022) |
| eligible 'vulnerable'           | 0.076***        | (0.015) | 0.114***     | (0.020) | 0.033        | (0.026) |
| <i>quintile of wealth index</i> |                 |         |              |         |              |         |
| 1st quintile                    | -0.021          | (0.021) | -0.069**     | (0.032) | 0.059        | (0.052) |
| 2nd quintile                    | -0.006          | (0.019) | -0.056*      | (0.032) | 0.036        | (0.023) |
| 4th quintile                    | -0.056***       | (0.017) | -0.114*      | (0.065) | -0.046***    | (0.016) |
| 5th quintile                    | -0.190***       | (0.021) | -0.142*      | (0.075) | -0.172***    | (0.020) |
| <i>health status</i>            |                 |         |              |         |              |         |
| # of chronically ill            | 0.025***        | (0.007) | 0.026**      | (0.013) | 0.027***     | (0.009) |
| # temporary ill                 | 0.011           | (0.011) | 0.021        | (0.019) | 0.005        | (0.013) |
| mean standardized BMI           | -0.007***       | (0.002) | -0.010**     | (0.004) | -0.006**     | (0.003) |
| overweight                      | 0.005           | (0.007) | 0.014        | (0.011) | -0.000       | (0.008) |
| underweight                     | -0.012          | (0.026) | -0.015       | (0.043) | -0.012       | (0.030) |
| Observations                    | 6510            |         | 2781         |         | 3729         |         |

Standard errors in parentheses

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

Marginal effects from a probit model of affiliation to RAMED in 2015 as a function of 2012 covariates.

Table 2.C.2 – covariate balance test, by residency, baseline

|                                      | national     |              |                 | rural        |              |               | urban        |              |               |
|--------------------------------------|--------------|--------------|-----------------|--------------|--------------|---------------|--------------|--------------|---------------|
|                                      | Mean Control | Mean Treated | Diff. Pr(T> )   | Mean Control | Mean Treated | Diff. Pr(T> ) | Mean Control | Mean Treated | Diff. Pr(T> ) |
| consultation (0/1)                   | 0.36         | 0.41         | 0.05 0.00***    | 0.33         | 0.34         | 0.01 0.58     | 0.48         | 0.50         | 0.02 0.33     |
| urban                                | 0.47         | 0.46         | -0.01 0.47      | 0.00         | 0.00         | 0.00          | 1.00         | 1.00         | 0.00          |
| hh head age                          | 50.80        | 52.03        | 1.23 0.00***    | 51.14        | 51.71        | 0.57 0.28     | 51.16        | 52.41        | 1.25 0.02***  |
| square of hh head age                | 2771         | 2880         | 110 0.01***     | 2790         | 2853         | 64 0.27       | 2767         | 2912         | 145 0.01***   |
| woman head                           | 0.14         | 0.19         | 0.04 0.00***    | 0.10         | 0.12         | 0.02 0.17     | 0.24         | 0.26         | 0.02 0.22     |
| hh head educ. : none                 | 0.85         | 0.90         | 0.05 0.00***    | 0.95         | 0.95         | 0.00 0.88     | 0.82         | 0.84         | 0.02 0.27     |
| hh head educ. : lower secondary      | 0.08         | 0.06         | -0.02 0.00***   | 0.04         | 0.04         | 0.00 0.84     | 0.10         | 0.09         | -0.01 0.37    |
| hh head educ. : higher ed.           | 0.02         | 0.01         | -0.01 0.0020*** | 0.00         | 0.00         | 0.00 0.61     | 0.02         | 0.02         | 0.00 0.81     |
| hh size                              | 4.97         | 4.99         | 0.02 0.77       | 5.45         | 5.30         | -0.15 0.11    | 4.73         | 4.64         | -0.10 0.29    |
| # of female                          | 2.48         | 2.51         | 0.03 0.41       | 2.67         | 2.61         | -0.07 0.24    | 2.45         | 2.41         | -0.04 0.45    |
| # of children                        | 0.75         | 0.77         | 0.02 0.52       | 0.88         | 0.85         | -0.04 0.38    | 0.71         | 0.68         | -0.03 0.38    |
| # of elderly                         | 0.29         | 0.32         | 0.03 0.14       | 0.29         | 0.31         | 0.02 0.29     | 0.27         | 0.32         | 0.06 0.02***  |
| prop. in employment                  | 0.44         | 0.41         | -0.03 0.00***   | 0.43         | 0.42         | -0.01 0.32    | 0.41         | 0.41         | 0.00 0.95     |
| # of self-employed                   | 0.73         | 0.69         | -0.04 0.12      | 0.80         | 0.76         | -0.03 0.31    | 0.62         | 0.61         | -0.01 0.75    |
| theoretical eligibility "poor"       | 0.14         | 0.17         | 0.03 0.01***    | 0.16         | 0.17         | 0.02 0.26     | 0.18         | 0.18         | 0.00 0.87     |
| theoretical eligibility "vulnerable" | 0.24         | 0.27         | 0.03 0.01***    | 0.43         | 0.43         | -0.01 0.74    | 0.09         | 0.10         | 0.00 0.82     |
| wealth index : 1st quintile          | 0.28         | 0.30         | 0.02 0.08*      | 0.54         | 0.53         | -0.01 0.78    | 0.03         | 0.04         | 0.01 0.47     |
| wealth index : 2nd quintile          | 0.26         | 0.27         | 0.01 0.5        | 0.36         | 0.36         | 0.00 0.89     | 0.15         | 0.16         | 0.01 0.46     |
| wealth index : 4th quintile          | 0.17         | 0.15         | -0.02 0.13      | 0.00         | 0.01         | 0.00 0.17     | 0.33         | 0.31         | -0.02 0.33    |
| wealth index : 5th quintile          | 0.09         | 0.04         | -0.05 0.00***   | 0.01         | 0.01         | 0.00 0.88     | 0.09         | 0.08         | -0.01 0.64    |
| # of chronically ill                 | 0.45         | 0.58         | 0.13 0.00***    | 0.46         | 0.51         | 0.05 0.11     | 0.61         | 0.67         | 0.06 0.11     |
| # of temporarily ill                 | 0.19         | 0.21         | 0.02 0.13       | 0.18         | 0.17         | -0.01 0.56    | 0.24         | 0.26         | 0.02 0.40     |
| hh mean BMI                          | 23.49        | 23.32        | -0.17 0.03***   | 23.29        | 23.29        | 0.00 0.99     | 23.41        | 23.36        | -0.05 0.67    |
| # of overweight                      | 0.98         | 0.91         | -0.06 0.02***   | 0.93         | 0.90         | -0.03 0.39    | 0.99         | 0.93         | -0.06 0.15    |
| # of underweight                     | 0.04         | 0.03         | -0.01 0.01***   | 0.03         | 0.03         | 0.00 0.76     | 0.02         | 0.02         | 0.00 0.73     |

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

**Table 2.C.3** – Diff-in-diff matching: consultation (0/1), 2012-15

|              | (1)<br>national        | (2)<br>rural          | (3)<br>urban          |
|--------------|------------------------|-----------------------|-----------------------|
| year 2015    | -0.148***<br>(0.00983) | -0.112***<br>(0.0117) | -0.179***<br>(0.0125) |
| RAMED        | 0.0371**<br>(0.0148)   | 0.0487***<br>(0.0184) | 0.0403**<br>(0.0166)  |
| diff-in-diff | 0.0286<br>(0.0201)     | 0.0494**<br>(0.0220)  | 0.000359<br>(0.0217)  |
| constant     | 0.389***<br>(0.00692)  | 0.316***<br>(0.00988) | 0.449***<br>(0.00937) |
| Observations | 13242                  | 5634                  | 7589                  |

Standard errors in parentheses

bootstrapped standard errors (50 replications)

\* p&lt;0.1, \*\* p&lt;0.05, \*\*\* p&lt;0.01

**Table 2.C.4** – Matching Diff-in-Diff : consultation by sector, 2012-2015

|              | national                |                         | rural                  |                        | urban                  |                        |
|--------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|
|              | (1)<br>public           | (2)<br>private          | (3)<br>public          | (4)<br>private         | (5)<br>public          | (6)<br>private         |
| year 2015    | -0.0831***<br>(0.00671) | -0.0802***<br>(0.00681) | -0.0565***<br>(0.0114) | -0.0667***<br>(0.0119) | -0.105***<br>(0.00878) | -0.0926***<br>(0.0110) |
| RAMED        | 0.0563***<br>(0.0119)   | -0.0199*<br>(0.0119)    | 0.0295*<br>(0.0156)    | 0.0233<br>(0.0169)     | 0.0905***<br>(0.0182)  | -0.0553***<br>(0.0159) |
| Diff-in-Diff | 0.0329**<br>(0.0132)    | 0.00148<br>(0.0130)     | 0.0614***<br>(0.0209)  | -0.0109<br>(0.0215)    | -0.00185<br>(0.0234)   | 0.0127<br>(0.0196)     |
| constant     | 0.180***<br>(0.00562)   | 0.219***<br>(0.00497)   | 0.145***<br>(0.00834)  | 0.177***<br>(0.00914)  | 0.210***<br>(0.00639)  | 0.252***<br>(0.00800)  |
| Observations | 13242                   | 13242                   | 5634                   | 5634                   | 7589                   | 7589                   |

bootstrapped standard errors in parentheses (50 replications)

\* p&lt;0.1, \*\* p&lt;0.05, \*\*\* p&lt;0.01

**Table 2.C.5 – Matching Diff-in-Diff : consultation by type, 2012-2015**

|              | national                 |                         | rural                  |                         | urban                   |                         |
|--------------|--------------------------|-------------------------|------------------------|-------------------------|-------------------------|-------------------------|
|              | (1)<br>outpatient        | (2)<br>hospital         | (3)<br>outpatient      | (4)<br>hospital         | (5)<br>outpatient       | (6)<br>hospital         |
| year 2015    | 0.000880<br>(0.00106)    | -0.0715***<br>(0.00576) | 0.000557<br>(0.000882) | -0.0591***<br>(0.00861) | 0.00125<br>(0.00195)    | -0.0818***<br>(0.00769) |
| RAMED        | -0.00708***<br>(0.00217) | 0.0381***<br>(0.00916)  | -0.00200<br>(0.00200)  | 0.0242*<br>(0.0142)     | -0.0126***<br>(0.00477) | 0.0575***<br>(0.0157)   |
| Diff-in-Diff | 0.00387<br>(0.00250)     | 0.00494<br>(0.0110)     | -0.000551<br>(0.00284) | 0.0410**<br>(0.0178)    | 0.00835<br>(0.00593)    | -0.0344*<br>(0.0183)    |
| constant     | 0.997***<br>(0.000819)   | 0.146***<br>(0.00472)   | 0.999***<br>(0.000755) | 0.119***<br>(0.00781)   | 0.996***<br>(0.00145)   | 0.168***<br>(0.00764)   |
| Observations | 13242                    | 13242                   | 5634                   | 5634                    | 7589                    | 7589                    |

bootstrapped standard errors in parentheses (50 replications)

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

**Table 2.C.6 – Matching Diff-in-Diff : Health expenditures, 2012-2013, by residency**

|              | rural                |                      |                       |                     | urban                 |                      |                       |                     |
|--------------|----------------------|----------------------|-----------------------|---------------------|-----------------------|----------------------|-----------------------|---------------------|
|              | (1)                  | (2)                  | (3)                   | (4)                 | (5)                   | (6)                  | (7)                   | (8)                 |
|              | any exp (0/1)        | p.cap. (qrt)         | p.cap. (ln)           | budget share (%)    | any exp (0/1)         | p.cap. (qrt)         | p.cap. (ln)           | budget share (%)    |
| year 2013    | 0.139***<br>(0.0133) | 0.397***<br>(0.0663) | -0.290***<br>(0.0522) | 1.331***<br>(0.226) | 0.116***<br>(0.0100)  | 0.259***<br>(0.0648) | -0.254***<br>(0.0443) | 0.551**<br>(0.237)  |
| RAMED        | 0.0469*<br>(0.0283)  | 0.368***<br>(0.131)  | 0.161<br>(0.113)      | 2.170***<br>(0.458) | 0.0306<br>(0.0231)    | -0.0283<br>(0.134)   | -0.209**<br>(0.0814)  | 0.895*<br>(0.481)   |
| Diff-in-Diff | 0.0361<br>(0.0357)   | 0.258<br>(0.176)     | 0.0348<br>(0.157)     | 0.152<br>(0.749)    | 0.0173<br>(0.0257)    | 0.237<br>(0.162)     | 0.0488<br>(0.104)     | 1.240*<br>(0.656)   |
| constant     | 0.567***<br>(0.0117) | 2.722***<br>(0.0529) | 6.043***<br>(0.0388)  | 7.835***<br>(0.157) | 0.658***<br>(0.00848) | 3.724***<br>(0.0490) | 6.684***<br>(0.0323)  | 11.09***<br>(0.183) |
| Observations | 5714                 | 5714                 | 3374                  | 5714                | 8086                  | 8086                 | 5385                  | 8086                |

bootstrapped standard errors in parentheses (50 replications)

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

**Table 2.C.7 – Matching Diff-in-Diff : Health expenditures, 2013-2015, by residency**

|              | rural                 |                       |                      |                       | urban                 |                       |                      |                       |
|--------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|
|              | (1)<br>any exp (0/1)  | (2)<br>p.cap. (qtr)   | (3)<br>p.cap. (ln)   | (4)<br>budg share (%) | (5)<br>any exp (0/1)  | (6)<br>p.cap. (qtr)   | (7)<br>p.cap. (ln)   | (8)<br>budg share (%) |
| year 2015    | -0.146***<br>(0.0149) | -0.407***<br>(0.0856) | 0.438***<br>(0.0690) | -0.311<br>(0.241)     | -0.221***<br>(0.0134) | -0.642***<br>(0.0707) | 0.731***<br>(0.0452) | -0.525**<br>(0.228)   |
| RAMED        | 0.0255<br>(0.0216)    | 0.219<br>(0.137)      | 0.108<br>(0.0832)    | 1.168***<br>(0.380)   | -0.00175<br>(0.0158)  | -0.0897<br>(0.105)    | -0.0706<br>(0.0640)  | 0.885**<br>(0.386)    |
| Diff-in-Diff | 0.0467<br>(0.0301)    | 0.272<br>(0.177)      | -0.0437<br>(0.129)   | 1.227**<br>(0.587)    | -0.00294<br>(0.0261)  | -0.107<br>(0.157)     | -0.208**<br>(0.0950) | 0.169<br>(0.570)      |
| constant     | 0.698***<br>(0.0104)  | 3.064***<br>(0.0593)  | 5.684***<br>(0.0432) | 8.903***<br>(0.165)   | 0.770***<br>(0.00622) | 3.958***<br>(0.0468)  | 6.309***<br>(0.0261) | 11.43***<br>(0.156)   |
| Observations | 4710                  | 4710                  | 2755                 | 4710                  | 7067                  | 7067                  | 4399                 | 7067                  |

bootstrapped standard errors in parentheses (50 replications)

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

# Chapter 3

## Caring or coping? Labor market effects of illness in the household<sup>1</sup>

### Contents

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|            |   |            |
|------------|---|------------|
| <b>3.1</b> | <b>Introduction</b>   | <b>121</b> |
| <b>3.2</b> | <b>Literature review</b>  | <b>122</b> |
| <b>3.3</b> | <b>Family labor response supply to severe health shocks and the value of health insurance</b> | <b>127</b> |
| <b>3.4</b> | <b>Methodology</b>  | <b>129</b> |
| 3.4.1      | Sample restriction  | 129        |
| 3.4.2      | Empirical specification   | 130        |
| <b>3.5</b> | <b>Descriptive statistics</b>   | <b>132</b> |
| <b>3.6</b> | <b>Results</b>  | <b>138</b> |
| 3.6.1      | Own illness   | 138        |
| 3.6.2      | Cross effects : illness of household head or spouse on children                               | 142        |
| 3.6.3      | Youth unemployment, inactivity, and head illness  | 144        |
| 3.6.4      | Other coping mechanisms   | 145        |
| <b>3.7</b> | <b>Mechanisms and robustness</b>  | <b>147</b> |
| 3.7.1      | Mechanisms: interaction with health insurance   | 147        |
| 3.7.2      | Different indicators of health shock  | 149        |
| 3.7.3      | Additional robustness tests   | 152        |
| <b>3.8</b> | <b>Conclusion</b>   | <b>155</b> |

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<sup>1</sup>chapter based on a working paper co-written with Abdelkader Teto



|   |            |
|---|------------|
| <b>References</b> . . . . .             | <b>157</b> |
| <b>Appendices</b> . . . . .             | <b>163</b> |
| <b>3.A Additional tables</b> . . . . .  | <b>163</b> |
| <b>3.B Additional figures</b> . . . . . | <b>170</b> |

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## 3.1 Introduction

Illness is one of the most frequent shocks faced by households in developing countries (Heltberg and Lund, 2009; Yilma et al., 2014). While most studies find that income decreases in case of illness (e.g. Gertler and Gruber, 2002; Heltberg and Lund, 2009; Sparrow et al., 2014), the impact of health shocks on consumption is more debated. Health insurance is typically incomplete and covers only a small proportion of the population. The majority of households relies on informal insurance to cover health care costs and to provide for living expenses if and when a breadwinner is unable to work. As a result, even without formal health insurance, households nonetheless benefit from a modicum of protection from the uncertainty linked to health (Morduch, 1999)

Previous studies have shown that the informal protection enjoyed by households benefit is typically incomplete and does not insulate them completely from the risks linked to illness. One bad health episode may plunge a household into poverty, or prevent it from escaping poverty (Gertler and Gruber, 2002). However, a number of recent articles on health shocks, based on surveys conducted in Asia, have found that consumption was virtually sheltered from illness shocks (Genoni, 2012; Khan, Bedi, and Sparrow, 2015; Liu, 2016; Mitra, Palmer, Mont, and Groce, 2016). This may be a beneficial side effect of the elevation of households living standards in those countries (respectively, Indonesia, Pakistan, China, and Vietnam).

Yet, this does not mean that there is no need for additional health insurance. As argued by Chetty and Looney (2006), for a given household, witnessing that consumption doesn't drop after the occurrence of a health shock is not enough to conclude that the household is unaffected by this shock. This could also reflect the household's high risk aversion, and thus his readiness to resort to extreme coping mechanisms in order to protect himself from a detrimental drop in consumption.

Thus, the precise nature of the coping mechanisms used by households in case of illness matters. In particular, some strategies to mitigate the adverse impact of illness may have detrimental impacts in the future, for instance if credit leads to overindebtedness, or if the sale of business assets or livestock reduced future earning opportunities.

One coping mechanism that has received relatively little attention is the reallocation of labor supply within the household. In some contexts, households command over a certain amount of "reserve labor"; inactive individuals may step up to take the place of an incapacitated worker. But the particular pattern of labor substitution between household members appears to be very context-dependent: for instance, Heath, Mansuri, and Rijkers (2018) find that the added worker mechanisms concerns only males in Ghana, while Comblon and Marazyan (2017) find that females are also concerned in Senegal.

From a normative point of view, it also matters where those added workers come from. If the additional workers were previously students that were forced to drop out to care for an ailing parent, the judgment will not be the same than if an idle uncle is concerned.

This chapter investigates the effects of illness shocks in contemporary Moroccan households. Using a nationally representative panel dataset, we study the coping mechanisms used by households facing a health shock in its main breadwinner. We provide suggestive evidence that household's consumption is relatively well sheltered against health shocks in consumption terms. This protection of consumption against illness is achieved through the mobilization of informal transfers, credit, and labor reallocation within the household. We show that health events suffered by the household head are accompanied by an entry on the labor market by previously inactive women, especially in urban areas, and by an increase of job search effort by young men in both urban and rural areas. Moreover, we document that the illness of the spouse of the household head may lead to withdrawals from the labour force, especially for boys in rural areas, which is consistent with informal care duties taking precedence over work, particularly in areas where healthcare supply is lacking. Finally, we do not find robust evidence that young household members abandon their studies in order to stand in for the sick household members; rather, the additional labor supply seems to come mostly from previously inactive individuals.

Overall, our results are consistent with a relatively good level of protection of household against health shocks, but with great differences between rural and urban inhabitants. Regarding the labour market, it is consistent with a view of high youth unemployment as being linked to demand-side factors, while low female unemployment would be mostly consistent with supply-side explanations.

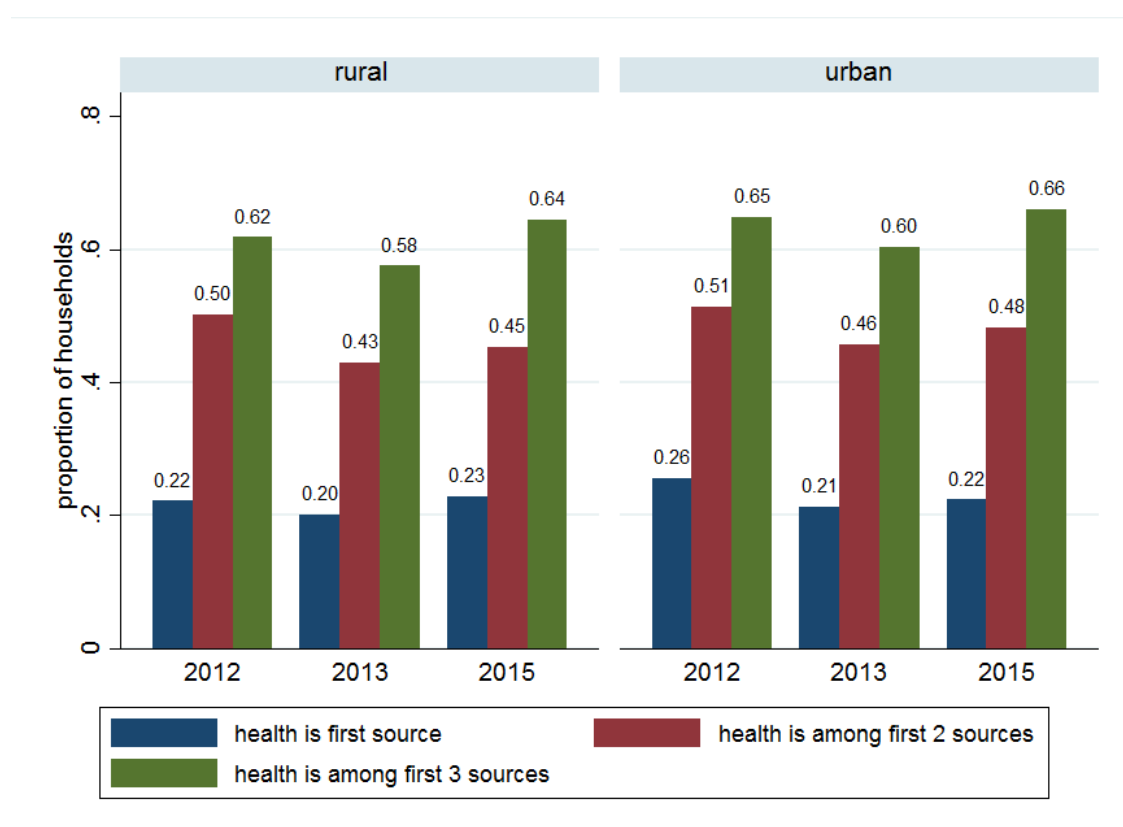
This chapter is structured as follows. Section 3.2 summarizes the literature related to this chapter's question. Section 3.3 presents a simple model explaining why the value of health insurance cannot be inferred by changes in consumption. The subsequent section presents the data and the methodology used in this paper. Section 3.5 is devoted to descriptive statistics of our main variables, while section 3.6 shows our empirical results. Section 3.7 investigates the mechanisms behind these results, as well as presenting some robustness checks. The last section discusses these results and concludes the chapter.

## 3.2 Literature review

**Health shocks and poverty in developing countries** Illness is among the most important type of shocks faced by poor households in developing countries. Banerjee

and Duflo (2007) report that across 13 countries, between 11 and 46% of poor households have at least one member bedridden or requiring professional health care, pointing to a “general pattern. . . of remarkably high morbidity”. Dercon (2005) surveys evidence according to which, depending on the country and the context, illness or death of a breadwinner is either the first or the second biggest sources of financial hardship for households close to or below the poverty line. Similar surveys undertaken in the context of Pakistan (Heltberg and Lund, 2009) or in Ethiopia (Yilma, Mebratie, Sparrow, Abebaw, Dekker, Alemu, and Bedi, 2014) confirm that illness is among the most important shocks that households have to deal with, both in terms of prevalence and of magnitude. In Morocco, the country we study in this paper, 23% of households list health or illness as their main source of concern for the future, and 47% of them rank illness among their two main sources of worry (cf. figure 3.1).

**Figure 3.1** – Health as source of concern among households, by year and residency



Source: ONDH, *Enquête Panel de Ménages*, author’s elaboration

Health shocks are a source of vulnerability for households in two respects. First, illness of a worker is associated with a loss of income for the whole household if the sick individual is incapacitated. In the context of Indonesia, Gertler and Gruber (2002) show that the illness of the household’s head is associated with a decrease of hours worked, of

the probability of participating in the labor market, and of the total household earnings. Qualitatively similar results are reported by Wagstaff (2007) for Vietnam, Abegunde and Stanciole (2008) for Russia, Khan, Bedi, and Sparrow (2015) for Pakistan, among others<sup>2</sup>.

Second, illness is a source of impoverishment for households because of healthcare costs. In the absence of widespread insurance or prepayment mechanisms, households in developing countries are often the principal source of healthcare financing through out-of-pocket (OOP) expenditures. The World Health Organization assesses that, in Lower- and Middle Income countries (LMICs), OOP payments represent about 40% of health spending to date (WHO, 2017). In the case of Morocco, the share of out-of-pocket payments in current health expenditure is higher, at 53% of current health expenditure in 2015 (down from 59% in 2005) (WHO, 2015).

Healthcare expenditures constitute an important proportion of the household's total outlays (Van Doorslaer et al., 2007; Xu et al., 2003). This may be a source of distortion for the measurement of poverty, which is typically undertaken on the basis of consumption expenditures: health expenditures may artificially "inflate" consumption and lead to an under-estimation of poverty in a given country (Van Doorslaer et al., 2006). This is especially likely to be the case as healthcare outlays are often considered to be "forced expenditure" rather than a matter of choice<sup>3</sup>.

**Coping mechanisms and partial insurance** Households in developing countries develop various strategies to reduce the exposition to shocks linked to illness and health. A well-known typology (Dercon, 2005) distinguishes between ex-ante risk management strategies, aiming at reducing the likelihood of being affected by a particular shock, and ex-post coping strategies, seeking to mitigate the negative impact of shocks once they have occurred. Example of these coping mechanisms include: recourse to remittances by migrants members (Ambrosius and Cuecuecha, 2013), asset and livestock sales (Hoddinott, 2006; Khan, Bedi, and Sparrow, 2015; Mitra, Palmer, Mont, and Groce, 2016; Rosenzweig and Wolpin, 1993), borrowing (Khan, Bedi, and Sparrow, 2015; Mitra, Palmer, Mont, and Groce, 2016; Sparrow, de Poel, Hadiwidjaja, Yumna, Warda, and Suryahadi, 2014; Yilma, Mebratie, Sparrow, Abebaw, Dekker, Alemu, and Bedi, 2014),

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<sup>2</sup>We are not aware of any studies on the effects of health shocks on household income in the context of the Middle East and North Africa (MENA) region, probably due to lack of suitable panel data.

<sup>3</sup>On the other hand, as noted by Flores et al. (2008), the proper estimation of the effect of health care costs on poverty measurement needs to take into account the origin of the funds used for health care payments. If these payments come from savings, the sale of durable goods, transfers or borrowing (all mechanisms that are generally considered 'benign' for the household), this will lead to an overestimation of the effect of health care payments on poverty, as opposed to the case were these payments come from a deduction on current expenditures.

dissaving (Sparrow, de Poel, Hadiwidjaja, Yumna, Warda, and Suryahadi, 2014; Yilma, Mebratie, Sparrow, Abebaw, Dekker, Alemu, and Bedi, 2014), and relying and transfers by the extended family and friends network (De Weerdt and Dercon, 2006; Fafchamps and Lund, 2003; Genoni, 2012; Sparrow, de Poel, Hadiwidjaja, Yumna, Warda, and Suryahadi, 2014).

As a results of such coping mechanisms, the household's living standards are partially sheltered from the negative consequences of illness shocks. Households' consumption is typically less responsive to health shocks than their income (De Weerdt and Dercon, 2006; Dercon and Krishnan, 2000; Townsend, 1994), although most studies reject full insurance (Asfaw and Braun, 2004; Fafchamps and Lund, 2003; Gertler and Gruber, 2002; Jalan and Ravallion, 1999; Morduch, 1999). However, several recent papers in this literature conclude to the ability of household to 'smooth out' entirely the effects of illness on consumption (Abegunde and Stanciole, 2008; Genoni, 2012; Khan et al., 2015; Mitra et al., 2016; Sparrow et al., 2014). This may reflect the general increase in living standards compared to studies of the previous generation; this may as well be the effect of the establishment of social safety nets in the countries under study.

One normative implication of the consumption smoothing literature is that potential welfare gains from putting in place social health insurance might be smaller than what they appear at first sight (Morduch, 1995). If households are able to cover themselves against health shocks through private means, an extension of formal social insurance schemes risks crowding out informal solidarity mechanisms, leaving the population no better off than before (Cox and Jimenez, 1992; Strupat and Klohn, 2018). This is especially likely to be the case if private transfers are motivated by altruistic concerns, as opposed to reciprocity or risk pooling motivations (Cox and Fafchamps, 2007).

A recent strand of research is focused on unpacking the coping mechanisms against health shocks, and try to discriminate between the relatively benign ones and those that might have negative dynamic effects. In particular, sale of assets in response to health shocks may be linked to worse outcomes in the future, if they are used as inputs in the production process (Khan et al., 2015). Health expenditures are also sometimes linked with reduced educational investments, or with over-indebtedness (Genoni, 2012).

In this context, a focus on labor market behavior in the face of illness is likely to yield insights about the true welfare cost of illness at the household level.

### **Labor supply and illness: the “added worker effect” and other mechanisms**

The interaction between the labor market behavior of different household members has been extensively studied in the US, as part of the debate on possible ‘crowding out’ effects of unemployment insurance: the “added worker effect” (Cullen and Gruber, 2000;

Lundberg, 1985) refers to the case when one spouse is induced to join the labor market as a response to the other partner losing his or her job. This issue is not limited to high income countries: for instance, Fernandes and Felício (2005) find evidence of an adder-worker effect linked to unemployment benefits in the context of Brazil.

Do health care events in one spouse lead to an “added worker” mechanism for other family members? In the US context, Coile (2004) found little evidence in favor of a health-related added worker effect between spouses, but Dalton and LaFave (2017), using genealogically linked longitudinal data, show that the financial impacts of health shocks are smoothed out through the extended household: sons and daughters react *inter alia* by reallocating to home production and drawing down home equity; parents who have suffered a health shock receive increased transfer and in-kind support from their family. In a developing country context, Heath, Mansuri, and Rijkers (2018), using high-frequency labor supply data from urban Ghana, show that men are 11 percentage points more likely to work in weeks in which another worker in the household is ill; they do not find any effect for women, regardless of previous employment status. In a West African context, Comblon and Marazyan (2017), using original data explicitly designed to take into account the complex structure of Senegalese household, find evidence of a significant added worked effect for adults of both sexes, as well as for boys and girls, in response to chronic illness of another household member. They also find that different household members react differently according to the nature of their relationship with the ill person. Their result suggest that “social norms regarding gender roles may be challenged when households have to compensate for earning losses”. Liu (2016) finds that the extension of formal health insurance in rural China has led to a decrease in child labor and an increase in educational investment, a result consistent with the idea that the child labor was previously used as insurance against illness. Noticeably, even before the introduction of formal health insurance, the household’s consumption and income appeared to be fully insulated from the effect of illness, thus strengthening the argument that the absence of a consumption drop is not enough to conclude to full insurance.

Household labor supply response to illness shocks can take other forms. For instance, Adhvaryu and Nyshadham (2017), in the context of agricultural household in Tanzania, find that individuals with prolonged illness switch from farm labor to enterprise activity. Other, non-sick family members have the same pattern of response, which is interpreted as evidence for synergies in household labor.

### 3.3 Family labor response supply to severe health shocks and the value of health insurance

Is the response of consumption in the face of illness really a good indicator of the welfare cost of ill health? Chetty and Looney (2006), using a simple insurance model, show that it is not possible to infer the welfare gains from insurance simply from the magnitude of the consumption drop after an illness shock. The welfare cost of ill health, which implicitly also define the welfare gains or health or disability insurance, depends on the product of the consumption drop and the household's risk aversion; moreover, both factors are likely to be inversely related. Intuitively, very risk averse households will resort to extremely costly consumption smoothing mechanisms (say, by taking a youth out of school) in order to avoid variations in consumption following a health shock. As a consequence, two observationally equivalent households in terms of consumption drop may have different risk aversion, as a consequence may have different amounts to gain from insurance. In this section, we present a simplified version of their argument that provides a theoretical background for the empirical investigation that we perform in the later part of the chapter.

We consider households with a concave utility function  $u$  defined over consumption, which is obtained through work with disutility  $\phi(c) = \theta c$ . The parameter  $\theta$  indexes the "cost" of reaching consumption level  $c$ ; a negative shock to household's income can be modeled as an increase in  $\theta$ . We consider the cases where there are two states,  $\theta_g$  and  $\theta_b$ , denoting respectively 'good health' and 'bad health', with  $\theta_g < \theta_b$ . Without loss of generality, we can normalize the effort in good health states as  $\theta_g = 1$ . We denote by  $p$  the probability of the bad state occurring.

Suppose that the household is able to purchase actuarially fair insurance against a drop in consumption in the bad state: it pays a premium  $\alpha$  in the good state of nature in exchange for a transfer of  $L$  in bad states. Actuarially fair insurance requires that payouts in bad times are equal in expectations to the premium collected in good times. This allows us to express the premium  $\alpha$  as a function of the size of the transfer desired in bad states:  $\alpha = \frac{1-p}{p}L$

The household's expected utility can be written as:

$$p[u(c_b + \alpha) - \theta_b c_b] + (1 - p)[u(c_g - L) - c_g]$$

Starting from no insurance, the welfare gain of a marginal increment in insurance cover-



age is

$$\begin{aligned}\Delta W &= pu'(c_b) - (1-p) \left( \frac{p}{1-p} \right) u'(c_g) \\ &= p[u'(c_b) - u'(c_g)]\end{aligned}\tag{3.1}$$

that is the probability of health shocks times the difference in marginal utilities between the good and the bad state. It is apparent that  $\Delta W$  is positive, as  $c_g > c_b$  and marginal utility is decreasing. If actuarially fair insurance is available, the household will want to buy the maximum amount possible (full insurance).

We can convert equation (3.1) in money-metric form by dividing it by the welfare gain of 1\$ of consumption in the good state:

$$\Delta W = \frac{p}{1-p} \frac{u'(c_b) - u'(c_g)}{u'(c_g)}\tag{3.2}$$

Using a Taylor approximation  $u'(c_b) - u'(c_g) \approx u''(c_g)(c_b - c_g)$ , we can rewrite equation (3.2) as

$$\Delta W \approx \frac{p}{1-p} \frac{-u''(c_g)}{u'(c_g)} (c_g - c_b)$$

multiplying and dividing by  $c_g$  yields

$$\Delta W \approx \frac{p}{1-p} \gamma \frac{\Delta c}{c}\tag{3.3}$$

where  $\gamma$  is the coefficient of relative risk aversion ( $\gamma = -\frac{u''(c)c}{u'(c)}$ ) and  $\Delta c/c$  represents the percent decrease in consumption between good and bad times.

Equation (3.3) states that the welfare gain from social insurance is increasing in the odds of a bad state ( $p/1-p$ ), in risk aversion  $\gamma$ , and in the drop in consumption in case of shock. For a large class of utility functions,  $\gamma$  and  $\Delta c/c$  are inversely related (Chetty, 2006): a low drop of consumption is justified by a high risk aversion. Intuitively, when households are close to the subsistence level, they may be ready to use very costly consumption smoothing mechanisms (taking a child out of school, selling vital assets, etc.) in order to avoid a drop in consumption.

Such a mechanism can be seen clearly by use of a parametric example using constant relative risk aversion utility, i.e.  $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$ . In this case, the household solves the following consumption maximization program in each state :

$$\max_c \frac{c^{1-\gamma}}{1-\gamma} - \theta c$$

yielding an optimum level of consumption  $c_s^* = \theta_s^{-1/\gamma}$ ,  $s = g, b$ . We then have

$$\begin{aligned} \frac{\Delta c}{c} &= 1 - \frac{c_b}{c_g} \\ &= 1 - \left( \frac{\theta_g}{\theta_b} \right)^{1/\gamma} \end{aligned}$$

hence, the consumption drop  $\Delta c/c$  increases with  $\theta_b$  and decreases with risk aversion  $\gamma$ .

## 3.4 Methodology

### 3.4.1 Sample restriction

**Table 3.1** – Structure of the data

|                         | 2012        |            | 2013        |            | 2015        |            |
|-------------------------|-------------|------------|-------------|------------|-------------|------------|
|                         | individuals | households | individuals | households | individuals | households |
| <b>national</b>         |             |            |             |            |             |            |
| total                   | 37444       | 7854       | 34846       | 7680       | 35547       | 7972       |
| of which: non-splitters | 37444       | 7854       | 34374       | 7372       | 32793       | 7010       |
| of which : non-single   | 37029       | 7439       | 34022       | 7020       | 32487       | 6704       |
| <b>rural</b>            |             |            |             |            |             |            |
| total                   | 16527       | 3119       | 15663       | 3123       | 14733       | 3352       |
| of which: non-splitters | 16527       | 3119       | 15498       | 3028       | 14102       | 2958       |
| of which : non-single   | 16400       | 2992       | 15384       | 2914       | 13989       | 2845       |
| <b>urban</b>            |             |            |             |            |             |            |
| total                   | 20917       | 4735       | 19183       | 4557       | 17598       | 4620       |
| of which: non-splitters | 20917       | 4735       | 18876       | 4344       | 16789       | 4052       |
| of which : non-single   | 20629       | 4447       | 18638       | 4106       | 16596       | 3859       |

Our analysis is done at the level of the individual within the household. The *EPM* dataset tracks individuals who were part of the original household in 2012 but who left it in a subsequent period to form a new household, mostly for marriage or work reasons. We exclude these “splitter” households from our analysis and keep only the members of the original household cell. We also drop from our sample all single-person households (415 individuals in 2012, or 4.4% of the total number of households present in the sample). Overall, we are left with 37029 individuals from 7539 households in 2012. The structure of our sample over time is shown in table 3.1. The attrition is 8% between wave 1 and wave 2, and 4.5% between wave 2 and wave 3.

### 3.4.2 Empirical specification

Our empirical specification is the following:

$$Y_{iht} = \beta_0 + \sum_k \beta_{1k} \text{Illness}_{kht} + \beta_2 \text{Illness}_{iht} + \beta_3 X_{iht} + \delta_i + \gamma_t + \lambda_r \cdot \gamma_t + \epsilon_{it} \quad (3.4)$$

where subscripts  $i$ ,  $h$  and  $t$  represent individuals, households, and survey year, respectively. The main outcome variable  $Y$  is the employment status of the individual, coded as 1 if the respondent is currently working, and zero otherwise. We also consider other variables related to the individual's labor supply: the number of hours worked in the past week, the natural logarithm of individual earnings, and the natural logarithm of total household earnings.

Our independent variable of interest is the dummy variable  $\text{Illness}_k$ , with the  $k$  subscript indexing household members other than the respondent. We mainly focus on the effect of illness in the household head and his spouse. We control for illness of the respondent,  $\text{Illness}_i$ , to account for potential correlation of negative health shock inside the household. Our variable for illness comes from a question on self-perceived illness: respondent are asked if they have been ill in the past 4 weeks; if the answer is 'yes', details about the nature and length of the illness as well as the consultation behavior are collected. Additional indicators of illness are considered as a robustness check (see below).

In addition to illness, we control for individual and household-level controls, included in the  $X$  vector: age and age square of the respondent, area of residency (urban or rural), age and age square of the household head and the spouse of the household head (where applicable). Other time-varying covariates include the size of the household and its structure: number of women, of children of less than 6 years old, of youth aged 7 to 14 years old, and of people aged 60 and more. Some of these might be "bad controls" in the sense of being themselves the outcome of our independent variable of interest; their inclusion might thus bias our results (Angrist and Pischke, 2009). As a robustness check, we estimate our model without these controls for household structure. We also include a control  $\gamma_t$  for the panel survey year, as well as a complete set of interactions between the survey year and the region of residence,  $\lambda_r$ , to account for region-specific time trends in labor markets.

Our model is estimated in panel using a *within* transformation, removing all the individual time-invariant factors, observable as well as unobservables, designated in our specification by  $\delta_i$ . This specification effectively controls for potential unobserved confounding variables, factors affecting illness and dependent variables at the same time.

**Threats to identification** Empirical work on the effects of illness on employment, especially at the household level, is vulnerable to several threats to identification. First, measurement error in our variable of interest might complicate the interpretation of our results. In particular, since we are using self-declared illness, we might be worried that measurement error is non-random and is linked to our outcome variables. This is the case when using self-declared days of disability due to illness: as noted by Genoni (2012), these variables already incorporate a decision with regards to labor supply, and as such are potentially endogenous. Another concern with self-declared illness is vulnerable to systematic differences in the perception of illness as a function of socioeconomic conditions (Strauss and Thomas, 1998).

We deal with measurement error in two ways. First, To minimize the risk of systematic bias coming from measurement error, we stratify our sample according to residency (urban/rural) and gender of the respondent. While our main indicator of health shock is self-declared illness, we consider other indicators of ill health: detailed illness status (i.e., whether the illness was temporary or chronic), hospitalization, and death. Death is the most objective indicator of an extreme health event having taken place in the household, but its drivers may be quite different from the other variables. Hospitalization represents a middle ground between our self-declared illness variable and the extreme event represented by death. It is also self-declared, but arguably less subjective than self-declared illness: having spent a night at the hospital is not something that depends on the perception of the respondent.

Causal identification is also at risk if there are omitted confounding variables affecting at the same time the outcome (labor market status) and illness. We can think at household- and community level variables such as bad hygiene and/or environmental factors, but also unobservable idiosyncratic factors (general health state). We control for regional trends by adding an interaction between region and time. Latent health and household unobservables are controlled for by the fixed effect specification that removes time-invariant unobservables.

A third threat to identification relates to the possibility of reverse causation or feedback effects from labor market participation to health. This is a possibility if adverse working conditions are linked to worse health outcomes. We provide evidence in favor of our mechanism by using information on the insurance status of household member, and look at differential responses to another member's health shock according to whether he is insured or not. While not formally excluding reverse causality, the result of these interaction models are consistent with an "added worker" mechanism.

### 3.5 Descriptive statistics

**Table 3.2** – Summary of dependent variables, by gender and residency

|  | rural            |       |                  |       | urban            |       |                  |       |
|--|------------------|-------|------------------|-------|------------------|-------|------------------|-------|
|  | men              |       | women            |       | men              |       | women            |       |
|  | mean/sd          | count | mean/sd          | count | mean/sd          | count | mean/sd          | count |
| total household income (ln)            | 10.24<br>(0.85)  | 10962 | 10.13<br>(0.88)  | 10817 | 10.69<br>(0.81)  | 13797 | 10.61<br>(0.83)  | 14649 |
| consumption p.pers (ln)                | 9.12<br>(0.56)   | 10962 | 9.10<br>(0.56)   | 10817 | 9.64<br>(0.66)   | 13797 | 9.63<br>(0.66)   | 14649 |
| wealth index                           | -0.83<br>(0.69)  | 10962 | -0.84<br>(0.70)  | 10817 | 0.63<br>(0.63)   | 13797 | 0.61<br>(0.62)   | 14649 |
| health expenditure (hh total- DH)      | 3431<br>(8786)   | 16480 | 3399<br>(8897)   | 16322 | 5346<br>(13549)  | 20966 | 5494<br>(13351)  | 22244 |
| transfers received - hh total (DH)     | 2155<br>(8194)   | 16480 | 2913<br>(8941)   | 16322 | 8331<br>(22959)  | 20966 | 8710<br>(21422)  | 22244 |
| individual work income (ln)            | 9.72<br>(0.84)   | 5521  | 9.09<br>(0.98)   | 316   | 10.13<br>(0.80)  | 4470  | 9.71<br>(1.00)   | 685   |
| weekly hours worked                    | 46.24<br>(15.71) | 8671  | 43.28<br>(16.44) | 541   | 45.66<br>(15.24) | 9974  | 42.68<br>(13.82) | 2622  |
| employed (0/1)                         | 0.697            | 16477 | 0.044            | 16311 | 0.565            | 20949 | 0.130            | 22214 |
| in labour force (0/1)                  | 0.746            | 16477 | 0.054            | 16311 | 0.661            | 20949 | 0.170            | 22214 |
| student or pupil (0/1)                 | 0.092            | 16477 | 0.053            | 16311 | 0.153            | 20949 | 0.126            | 22214 |
| any transfert received, hh level (0/1) | 0.153            | 16477 | 0.206            | 16311 | 0.260            | 20949 | 0.300            | 22214 |
| any health exp, hh level (0/1)         | 0.641            | 16477 | 0.639            | 16311 | 0.674            | 20949 | 0.691            | 22214 |

pooled data (all waves). statistics computed for individuals aged 15 years old or older, in non-single households, splitters excluded. standard deviations in parentheses.

Table 3.2 presents summary statistics of dependent variables, by gender and residency (urban or rural areas). Both consumption per capita and total household income are higher in urban areas than in rural areas. This differential in living standards between cities and countryside is also reflected in differences in the wealth index (-0.83 in rural areas against 0.63 in cities).

With regards to labor market variables, the proportion of our sample currently in employment is somewhat higher in rural areas: 37% compared to 34% in cities. This overall higher rate of activity in rural areas covers up sizable differences according to gender: 70% of the men in rural areas are employed in rural areas against 4% of women (57% for men against 13% for women in cities). The higher employment rate of men in rural areas does not seem to come from demographic confounders: the mean age is similar in rural and in urban areas (cf. table 3.4). Although hours worked are similar in urban and rural areas, average incomes are much lower in the latter (9.72 ln DH against 10.13 ln DH).

Differences in living standards between rural and urban are also reflected in transfers received and health expenditures. The share of residents living in households with positive health expenditures is higher in urban areas (67% against 63%), as is the mean

expenditure on health (5405 DH against 3403 DH). The higher amount of transfers received reflects the fact that a larger proportion of individuals benefit from a government retirement, something that is very rare in rural areas.

**Table 3.3** – Illness by type and relation to household head, all waves

|                            | rural |       |       | urban |       |       |
|----------------------------|-------|-------|-------|-------|-------|-------|
|                            | total | men   | women | total | men   | women |
| <i>own illness</i>         |       |       |       |       |       |       |
| any illness                | 0.128 | 0.117 | 0.140 | 0.167 | 0.139 | 0.193 |
| acute or temporary illness | 0.033 | 0.029 | 0.037 | 0.038 | 0.032 | 0.043 |
| chronic disease            | 0.093 | 0.083 | 0.102 | 0.127 | 0.105 | 0.148 |
| wound, accident, burn      | 0.003 | 0.004 | 0.001 | 0.002 | 0.003 | 0.002 |
| Observations               | 32801 | 16480 | 16321 | 43210 | 20966 | 22244 |
| <i>illness of hh head</i>  |       |       |       |       |       |       |
| any illness                | 0.203 | 0.202 | 0.205 | 0.265 | 0.253 | 0.276 |
| acute or temporary illness | 0.045 | 0.045 | 0.046 | 0.049 | 0.048 | 0.051 |
| chronic disease            | 0.153 | 0.152 | 0.154 | 0.212 | 0.202 | 0.222 |
| wound, accident, burn      | 0.005 | 0.005 | 0.005 | 0.003 | 0.003 | 0.003 |
| Observations               | 32801 | 16480 | 16321 | 43210 | 20966 | 22244 |
| <i>illness of spouse</i>   |       |       |       |       |       |       |
| any illness                | 0.191 | 0.193 | 0.189 | 0.238 | 0.236 | 0.241 |
| acute or temporary illness | 0.044 | 0.045 | 0.044 | 0.044 | 0.044 | 0.045 |
| chronic disease            | 0.146 | 0.148 | 0.144 | 0.192 | 0.191 | 0.194 |
| wound, accident, burn      | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 |
| Observations               | 29146 | 14953 | 14193 | 34592 | 17702 | 16890 |

all waves, individuals aged 15 or older. Self-declared illness (recall period: past 4 weeks)

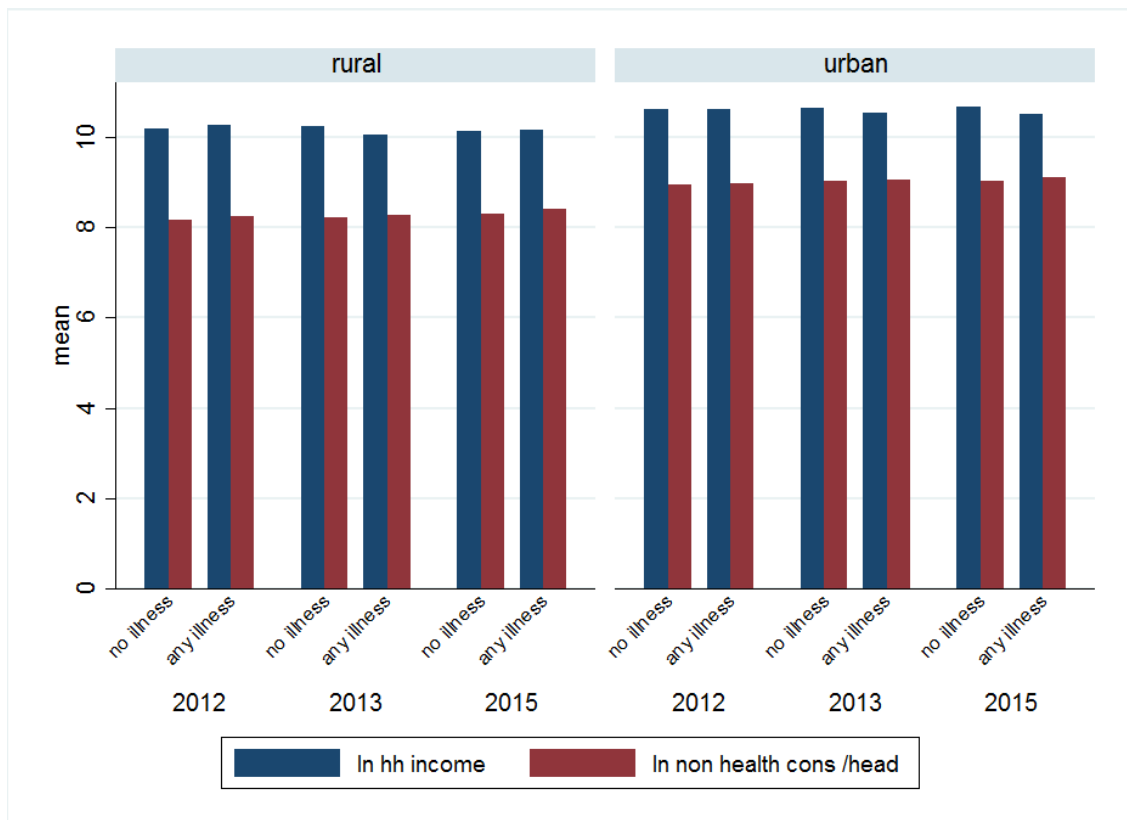
**Self-declared illness** Table 3.3 displays the means of the indicators for illness, by residency and gender. To study labor reallocation within the household, we include, on top of individual illness, the illness status of the household head and of his spouse (for married couples). Regarding own illness, self-declared morbidity is higher in urban areas compared to rural areas (13.9% of urban men compared to 11.7% in the countryside; 19.1% for urban women against 14% in rural areas). Overall morbidity is also higher for women compared to men, as is usually the case. Most of the self-declared morbidity comes from chronic illness for all categories of individuals.

The middle and bottom panel of table 3.3 depict the illness of the household head and of the head's spouse. For these individuals, self-declared morbidity is higher in urban areas (26.4% for household heads in cities, against 20.5% in rural areas; 23.9% for spouses in urban areas against 19.2% in the countryside). For most measures, there is no difference in self-declared morbidity between men and women respondents, except for household heads in urban areas, where women respondents are more numerous to

declare having a sick household head (27.6% against 25.2% for men). This may reflect the confounding factor of age, if women stay longer at the parent's home than men.

**Illness, living standards and labor reallocation** Descriptive statistics suggest that both income and consumption are rather well protected against illness shocks. Figure 3.2 displays the mean of household income and consumption, by year and residency, according to the illness status of the household head. Mean household revenue is generally lower for households where the head declares having been sick in the past 4 weeks, but the magnitude of the drop is of modest magnitude (-0.5% of total household revenue in rural areas, and -0.8% in urban areas). Non-health consumption per head does not seem to be negatively correlated to the self-declared illness status of the household head.

**Figure 3.2** – household revenue and consumption per head, by illness of household head

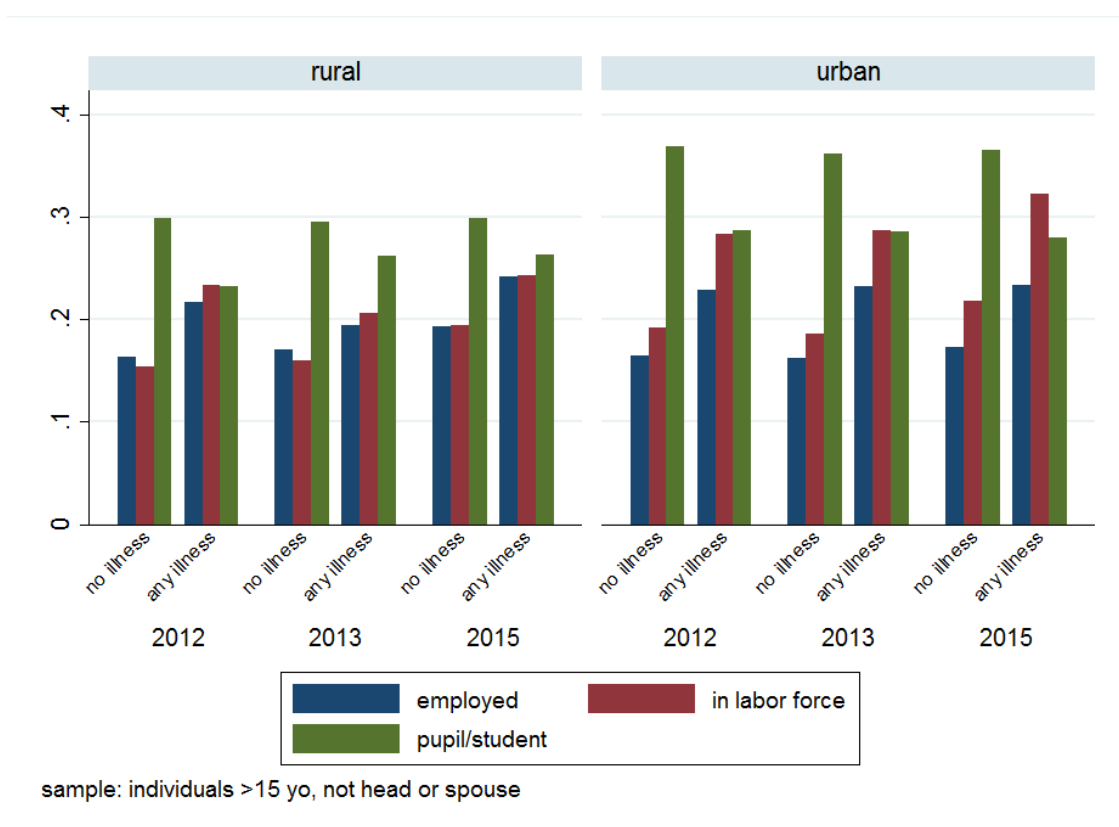


The fact that household revenue does not seem to be adversely impacted by the illness of the household head, leads us to suspect that there is some within-household reallocation of labor supply. This is all the more the case that, in the majority of our households, the head is the only breadwinner. The mean number of employed persons per household is 1.5 (1.4 in cities and 1.7 in rural areas), and the household head is employed 74% of the time (78% in rural areas, 71% in urban areas). Thus, illness of the household head is

probably accompanied by compensating mechanisms, such as private transfers or labor reallocation.

Figure 3.3 lends direct support to the labor reallocation mechanism in case of sickness of the head. For children of the household head<sup>4</sup>, the probability of being employed is higher when the household head is ill (27.1% against 20.8% for non-sick heads). The magnitude of the difference is even greater when the possibility of unemployment is taken into account: mean labour force participation rate is 21.6% for individuals whose household head does not declare any illness, against 31.8% for people with a sick household head. Finally, the reallocation of labor towards activity seems to happen to the detriment of individuals who were students or pupils before the health event: the probability of being in studies or schooling drops from 45.1% to 34.8% for people whose household head declares having been ill in the past 4 weeks (from 50.2% to 36.3% in urban areas; from 39.7% to 32.4% in rural areas).

**Figure 3.3** – Labour force participation by illness of household head



**Other covariates** Summary statistics (mean and standard deviation) of our main covariates are presented in table 3.4, disaggregated by residency (urban or rural). The over-

<sup>4</sup>As well as a “other household members”, a composite category aggregating the brothers and sisters of the head, parents, cousins, or helpers



**Table 3.4** – Summary statistics of covariates, by residency

|                            | overall |         | rural |         | urban |         |
|----------------------------|---------|---------|-------|---------|-------|---------|
|                            | mean    | sd      | mean  | sd      | mean  | sd      |
| urban                      | 0.56    | (0.50)  |       |         |       |         |
| woman                      | 0.51    | (0.50)  | 0.50  | (0.50)  | 0.52  | (0.50)  |
| literate                   | 0.61    | (0.49)  | 0.46  | (0.50)  | 0.72  | (0.45)  |
| age                        | 39.62   | (17.53) | 39.22 | (17.93) | 39.92 | (17.22) |
| health insurance coverage  | 0.21    | (0.41)  | 0.08  | (0.26)  | 0.32  | (0.47)  |
| marital status             |         |         |       |         |       |         |
| -single                    | 0.37    | (0.48)  | 0.34  | (0.47)  | 0.39  | (0.49)  |
| -married                   | 0.56    | (0.50)  | 0.60  | (0.49)  | 0.53  | (0.50)  |
| -widow/er                  | 0.05    | (0.22)  | 0.04  | (0.20)  | 0.06  | (0.23)  |
| -divorced                  | 0.02    | (0.13)  | 0.01  | (0.11)  | 0.02  | (0.15)  |
| schooling level            |         |         |       |         |       |         |
| -none                      | 0.42    | (0.49)  | 0.57  | (0.49)  | 0.31  | (0.46)  |
| -primary                   | 0.20    | (0.40)  | 0.22  | (0.42)  | 0.19  | (0.39)  |
| -lower secondary           | 0.16    | (0.37)  | 0.13  | (0.33)  | 0.18  | (0.39)  |
| -upper secondary           | 0.13    | (0.33)  | 0.05  | (0.23)  | 0.18  | (0.39)  |
| -higher ed.                | 0.09    | (0.28)  | 0.02  | (0.15)  | 0.14  | (0.34)  |
| relation to hh head        |         |         |       |         |       |         |
| -hh head                   | 0.28    | (0.45)  | 0.27  | (0.44)  | 0.29  | (0.45)  |
| -spouse                    | 0.23    | (0.42)  | 0.23  | (0.42)  | 0.22  | (0.42)  |
| -child (or child's spouse) | 0.42    | (0.49)  | 0.43  | (0.49)  | 0.41  | (0.49)  |
| -grandchild                | 0.01    | (0.10)  | 0.01  | (0.11)  | 0.01  | (0.10)  |
| -(step-)father/mother      | 0.02    | (0.15)  | 0.03  | (0.16)  | 0.02  | (0.14)  |
| -(step-) brother/sister    | 0.03    | (0.16)  | 0.02  | (0.15)  | 0.03  | (0.18)  |
| -other parent              | 0.01    | (0.10)  | 0.01  | (0.09)  | 0.01  | (0.10)  |
| -other, not parent         | 0.00    | (0.07)  | 0.00  | (0.06)  | 0.01  | (0.07)  |
| hh structure               |         |         |       |         |       |         |
| hh size                    | 5.82    | (2.60)  | 6.43  | (3.02)  | 5.34  | (2.11)  |
| # women in hh              | 2.90    | (1.60)  | 3.17  | (1.81)  | 2.70  | (1.38)  |
| # children                 | 0.68    | (0.98)  | 0.89  | (1.11)  | 0.52  | (0.82)  |
| # youth                    | 0.64    | (0.89)  | 0.79  | (1.03)  | 0.52  | (0.74)  |
| # elderly                  | 0.42    | (0.65)  | 0.47  | (0.70)  | 0.38  | (0.62)  |
| Observations               | 73922   |         | 32187 |         | 41735 |         |

pooled data (all years), unweighted. sample: individuals ages 15 and older

all composition of our sample in terms of age, gender, and relation to household head does not seem to differ between rural and urban areas. Urban individuals are more literate (72% against 46% in rural areas), and have a higher probability of having a schooling beyond primary school (50% against 21% in rural areas). Household size is greater in rural areas (6.4 persons per household on average against 5.3 in cities); this reflects a higher number of children per household in the countryside (as opposed to complex cohabitation patterns). Interestingly, both in rural and urban areas, nuclear household seem to be the norm, as 93% of household members are either the head, the spouse, or children. Finally, almost one third (32%) of the urban population is covered by some form of health insurance (either as a beneficiary, or as a dependent), while health insurance is very rare in rural areas (8%).

Table 3.5 shows the result of two sided t-test (respectively p-test for binary variables) for covariate balance at baseline, according to sickness status of the household head. The sample is restricted to individuals that are neither the household head nor his spouse (i.e. children, grandchildren, parents, and other household members; single-person households are dropped). There is no significant difference in gender, literacy rate or health insurance coverage between individual whose household head is sick and the others. The number of youth is lower and the number of elderly is higher in households with a sick head; this may reflect the confounding effect of the age of the household head, for which we will control in our multivariate specification. This might also explain the fact that the age of respondent is slightly higher (by 1.26 year in cities and 0.38 years in the countryside) in households where the head is sick.

There are some systematic differences in education, marital status and relation to the household head between household where the head is sick and others. In particular, in urban areas, individuals residing in an household with a sick head are 4.9 percentage points more likely not to have completed primary school, while they are 2.3 percentage points less likely to have benefited from higher education. They are also more likely to be the child of the household head (+5.8 percentage points in urban areas, +4.1 percentage points in rural areas) rather than have other links to the household heads. This points to the fact that the composition of households where the head is sick might differ systematically from other households. Tables 3.A.1 and 3.A.2 in the appendix shows the result of the same test, broken down by gender.

**Table 3.5** – Covariates by illness of household head, 2012

|                            | rural          |                 |               | urban          |                 |               |
|----------------------------|----------------|-----------------|---------------|----------------|-----------------|---------------|
|                            | (1) no illness | (2) any illness | diff. (1)-(2) | (1) no illness | (2) any illness | diff. (1)-(2) |
| age                        | 28.10          | 28.48           | -0.38         | 28.54          | 29.80           | -1.26***      |
| hh size                    | 7.26           | 7.68            | -0.42***      | 5.91           | 5.96            | -0.05         |
| # women in hh              | 3.56           | 3.70            | -0.14**       | 2.96           | 3.09            | -0.13***      |
| # children                 | 0.86           | 0.91            | -0.05         | 0.43           | 0.44            | -0.01         |
| # youth                    | 0.85           | 0.71            | 0.14***       | 0.49           | 0.42            | 0.07***       |
| # elderly                  | 0.46           | 0.68            | -0.21***      | 0.36           | 0.55            | -0.19***      |
| woman                      | 0.493          | 0.472           | 0.021         | 0.494          | 0.502           | -0.007        |
| literate                   | 0.639          | 0.630           | 0.008         | 0.867          | 0.879           | -0.012        |
| health insurance coverage  | 0.050          | 0.047           | 0.003         | 0.233          | 0.213           | 0.019*        |
| marital status             |                |                 |               |                |                 |               |
| -single                    | 0.696          | 0.655           | 0.040***      | 0.808          | 0.757           | 0.051***      |
| -married                   | 0.233          | 0.288           | -0.055***     | 0.120          | 0.182           | -0.062***     |
| -widow/er                  | 0.056          | 0.033           | 0.023***      | 0.052          | 0.027           | 0.026***      |
| -divorced                  | 0.015          | 0.023           | -0.009**      | 0.020          | 0.035           | -0.015***     |
| schooling level            |                |                 |               |                |                 |               |
| -none                      | 0.372          | 0.396           | -0.024        | 0.142          | 0.128           | 0.015*        |
| -primary                   | 0.681          | 0.673           | 0.008         | 0.290          | 0.339           | -0.049***     |
| -lower secondary           | 0.200          | 0.196           | 0.004         | 0.258          | 0.249           | 0.009         |
| -upper secondary           | 0.088          | 0.091           | -0.003        | 0.270          | 0.253           | 0.017         |
| -higher ed.                | 0.031          | 0.040           | -0.009        | 0.182          | 0.159           | 0.023**       |
| relation to hh head        |                |                 |               |                |                 |               |
| -child (or child's spouse) | 0.838          | 0.879           | -0.041***     | 0.815          | 0.873           | -0.058***     |
| -grandchild                | 0.017          | 0.041           | -0.024***     | 0.011          | 0.037           | -0.026***     |
| -(step-)father/mother      | 0.067          | 0.032           | 0.034***      | 0.059          | 0.020           | 0.038***      |
| Observations               | 5763           |                 |               | 7567           |                 |               |

individuals ages 15 and more, t-test of difference in means / p-test of differences in proportions for binary variables

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

## 3.6 Results

### 3.6.1 Own illness

As a starting point, we examine the effect of the individual's own illness on employment, hours worked, and income. Table 3.6 presents our baseline specification. For each outcome, we present the result of our main regression, using alternatively as our variable of interest a dummy for any kind of illness, and a set of dummies detailing the type of the main illness declared by the respondent: temporary/acute illness, chronic illness, and "other illness", a residual category mainly composed of accidents, burns, and injuries. All models are estimated using the within transformation, removing individual fixed effects.

Illness is associated with a reduction of the respondent's employment: the "any illness" dummy is associated with a 2.5 percentage point lower probability of being in employment (a 7% reduction over the baseline). By detailed illness status (column 2), the coefficient is greatest (in absolute value) for the category "other" (-6 p.p.), i.e. burns, accidents, and injuries, followed by chronic illness (-2.7 p.p.) and temporary or acute illness (-1.8 p.p.). All results are significant at the 5% threshold. Other covariates have

Table 3.6 – baseline specification (own illness), national

|                         | employed (0/1) |           |           | hours worked |           | own income (ln) |           | total household income (ln) |  |
|-------------------------|----------------|-----------|-----------|--------------|-----------|-----------------|-----------|-----------------------------|--|
|                         | (1)            | (2)       | (3)       | (4)          | (5)       | (6)             | (7)       | (8)                         |  |
| any illness             | -0.025***      |           | -0.088    |              | -0.036    |                 | -0.090*** |                             |  |
| own illness (ref. none) |                |           |           |              |           |                 |           |                             |  |
| - temp/acute            |                | -0.018*** |           | 0.301        |           | 0.002           |           | -0.093***                   |  |
| - chronic               |                | -0.027*** |           | -0.417       |           | -0.053          |           | -0.090***                   |  |
| - other                 |                | -0.060**  |           | 2.332        |           | -0.108          |           | -0.057                      |  |
| urban                   | -0.045         | -0.046    | 2.478     | 2.432        | -0.408*** | -0.408***       | 0.131*    | 0.132*                      |  |
| age                     | 0.022***       | 0.022***  | 0.268     | 0.272        | -0.005    | -0.005          | 0.012***  | 0.012***                    |  |
| age squared             | -0.000***      | -0.000*** | -0.003    | -0.003       | 0.000     | 0.000           | -0.000*** | -0.000***                   |  |
| hh size                 | -0.007**       | -0.007**  | -0.034    | -0.039       | -0.004    | -0.004          | 0.146***  | 0.146***                    |  |
| # women in hh           | 0.002          | 0.002     | -0.403    | -0.398       | 0.019     | 0.019           | -0.068*** | -0.068***                   |  |
| # children              | 0.002          | 0.002     | 0.108     | 0.114        | -0.044    | -0.045          | -0.114*** | -0.114***                   |  |
| # youth                 | 0.003          | 0.003     | 0.262     | 0.263        | 0.032     | 0.031           | -0.053*** | -0.053***                   |  |
| # elderly               | 0.004          | 0.004     | 0.795     | 0.797        | -0.042    | -0.042          | -0.006    | -0.006                      |  |
| Constant                | -0.317*        | -0.319*   | 31.869*** | 31.784***    | 9.891***  | 9.882***        | 9.338***  | 9.338***                    |  |
| moy                     | 0.355          | 0.355     | 45.472    | 45.472       | 9.869     | 9.869           | 10.449    | 10.449                      |  |
| N                       | 75950          | 75951     | 21808     | 21808        | 10992     | 10992           | 75667     | 75668                       |  |
| vce                     | cluster        | cluster   | cluster   | cluster      | cluster   | cluster         | cluster   | cluster                     |  |

region\*year interactions omitted, fixed effects estimation. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

mostly the expected signs: participation in the labor market increases with age, and total household size has a negative coefficient. The household structure variables are insignificant.

The ‘any illness’ dummy is associated with a decrease in the number of hours worked in the past week (column 3), but the result is not significant at the conventional thresholds. The effects of illness on own income (columns 5 and 6) are also insignificant. By contrast, the dummy for any kind of illness in the past week is associated with a decrease in (log) household income. The magnitude of the decline in household income (approximately -9%) is greater than the point estimate for own income (-3.5%). One explanation for this is the presence of intra-household correlation in illness, a point to which we return below.

These results are national aggregates. In table 3.7, we distinguish between rural and urban areas, as well as according to the link of the respondent to the household head: head, spouse, or child (or child’s spouse). The head of the household is male 88% of the time, and 99% of the time when a spouse is present. This presumably reflects prevalent gender norms: female-headed households are rare, and are either single-person households, widows or divorcees. For the sake of clarity, we omit the presentation of the age, household size and composition covariates.

Interesting patterns emerge. At the national level, self-declared illness is associated with a lower probability of being in employment for household heads and children (respectively, -4.6 p.p. and -3.0 p.p.). The coefficient is small and not statistically significant for spouses. This is consistent with traditional gender roles, with the man being the household’s main breadwinner, and the wife devoted to domestic work. However, column 8, with log household income as a dependent variable, paint a different picture: spouse illness is associated with a significant decrease in household income (-8.9%), comparable in magnitude to the coefficient for household heads (-8.2%). Several explanations for this apparent paradox are possible. First, this might reflect intra-household correlation in illness; second, this might be due to cross-effects between the illness of the spouse and the labour supply of working members, for example through informal health care (a phenomenon that has been extensively documented in industrialized country context, cf. Houtven, Coe, and Skira, 2013; Michaud, Heitmueller, and Nazarov, 2010; Schmitz and Westphal, 2017); third, this might reflect intra-household complementarities in entrepreneurial activity (Adhvaryu and Nyshadham, 2017).

When distinguishing between urban and rural (middle and bottom panels of table 3.7), the global patterns of significance and sign of the coefficients remain the same, although the magnitude differs according to the area of residency: self-declared illness is associated with a greater decrease in household income and in employment probability in rural areas. This is consistent with the fact that a higher proportion of people have access

**Table 3.7** – own illness, by link to household head, fixed effects

|                 | employed (0/1)          |                      |                        | own income (ln)     |                   |                   | total household income (ln) |                        |                       |
|-----------------|-------------------------|----------------------|------------------------|---------------------|-------------------|-------------------|-----------------------------|------------------------|-----------------------|
|                 | (1)<br>head             | (2)<br>spouse        | (3)<br>children        | (4)<br>head         | (5)<br>spouse     | (6)<br>children   | (7)<br>head                 | (8)<br>spouse          | (9)<br>children       |
| <b>national</b> |                         |                      |                        |                     |                   |                   |                             |                        |                       |
| any illness     | -0.0459***<br>(0.00738) | 0.00399<br>(0.00427) | -0.0296***<br>(0.0109) | -0.0433<br>(0.0418) | -0.474<br>(0.394) | 0.0205<br>(0.145) | -0.0819***<br>(0.0153)      | -0.0883***<br>(0.0167) | -0.116***<br>(0.0213) |
| N               | 21112                   | 17307                | 31655                  | 7191                | 370               | 3057              | 21016                       | 17233                  | 31555                 |
| <b>rural</b>    |                         |                      |                        |                     |                   |                   |                             |                        |                       |
| any illness     | -0.0557***<br>(0.0130)  | 0.00367<br>(0.00533) | -0.0559***<br>(0.0173) | -0.0688<br>(0.0559) | .                 | -0.106<br>(0.194) | -0.109***<br>(0.0261)       | -0.134***<br>(0.0276)  | -0.131***<br>(0.0374) |
| N               | 8728                    | 7610                 | 14011                  | 3990                | 109               | 1580              | 8704                        | 7587                   | 13975                 |
| <b>urban</b>    |                         |                      |                        |                     |                   |                   |                             |                        |                       |
| any illness     | -0.0373***<br>(0.00874) | 0.00419<br>(0.00638) | -0.0106<br>(0.0140)    | 0.0120<br>(0.0628)  | -0.366<br>(0.383) | 0.100<br>(0.218)  | -0.0528***<br>(0.0186)      | -0.0493**<br>(0.0201)  | -0.101***<br>(0.0253) |
| N               | 12384                   | 9697                 | 17644                  | 3201                | 261               | 1477              | 12312                       | 9646                   | 17580                 |

controls omitted, clustered standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

to formal health insurance in cities; this might also be due to differential perceptions of illness between rural and urban areas (i.e. rural inhabitants declaring to be ill only if they have been unable to work, while city-dweller would be more prone to define minor affections as “illness”).

To summarize, the examination of the effect of self-declared illness on labor market outcomes reveals several paradoxes that point toward very different realities in urban and rural areas, as well as complex relations between the illness of one member and the activity of the others. To examine these interdependencies further, we now turn to the estimation of cross effects.

### **3.6.2 Cross effects : illness of household head or spouse on children**

**Illness of the household head** We start by examining the effect of illness of the household head on labor market status of other household members (spouse included). The baseline results are reported in table 3.A.5, stratified by gender and residency of the respondent, and using the simple ‘any illness dummy’ of the household head as our main variable of interest. As we suspect within-household correlation in self-reported illness, we control for the respondent’s own self-declared illness status. We control for the household head’s age and age squared (in addition to the respondent’s).

At the national level, illness of the household head is linked to an increased probability for other respondents to be in employment (+0.8 p.p.). When distinguishing between areas of residency, the effect is significant only in urban areas (+1.3 p.p.). More precisely, the entirety of the effect seems to come from urban women (column 3) for this subset, illness of the household head is associated with a 1.2 percentage point increased probability of being in employment. The magnitude of this coefficient, while seemingly small, is nonetheless relevant when set against the low level of female labor force participation : it represents a 11% increase over the baseline probability of being employed for urban women (11.9%).

**Spouse illness** To investigate further labor reallocation within the household following illness of one member, we further restrict the sample to households headed by a married couple. Section 3.6.1 suggested that illness of spouses is associated with a significant decrease in household revenue, albeit of a stronger magnitude in rural compared to urban areas. This is puzzling, given that only a very small proportion of spouses work outside the home : 88% of spouses declare their activity status as “housewife” (85% in urban areas and 92% in rural areas). One explanation for this puzzle is that house-

**Table 3.8** – illness of household head, by gender, fixed effects

|                 | employed (0/1)         |                      |                        |
|-----------------|------------------------|----------------------|------------------------|
|                 | (1)<br>total           | (2)<br>men           | (3)<br>women           |
| <b>national</b> |                        |                      |                        |
| hh head sick    | 0.00815**<br>(0.00403) | 0.00949<br>(0.00834) | 0.00815**<br>(0.00399) |
| moy             | 0.233                  | 0.505                | 0.0829                 |
| N               | 54749                  | 19517                | 35232                  |
| <b>rural</b>    |                        |                      |                        |
| hh head sick    | 0.00348<br>(0.00585)   | 0.00758<br>(0.0129)  | 0.00247<br>(0.00497)   |
| moy             | 0.241                  | 0.607                | 0.0367                 |
| N               | 24018                  | 8612                 | 15406                  |
| <b>urban</b>    |                        |                      |                        |
| hh head sick    | 0.0134**<br>(0.00555)  | 0.0156<br>(0.0110)   | 0.0123**<br>(0.00591)  |
| moy             | 0.227                  | 0.425                | 0.119                  |
| N               | 30731                  | 10905                | 19826                  |

controls omitted, clustered standard errors in parentheses.

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

wife contribute in non-observed way to household revenue, for example by providing unpaid services that are complementary to the main breadwinner's activity (Adhvaryu and Nyshadham, 2017). Another possibility is that illness of the spouse is linked to labor reallocation from previously employed persons towards caring (Kochar, 1999, 2000). These two explanations need not be mutually exclusive.

To test this last proposition, we examine the effect of spouse's illness on the labor market outcomes of other household members. Table 3.9 shows the results using employment status as a dependent variables, by residency. We show the results for all the household members, and separately for the household head and for children. In addition to household size and structure, we control for the age and age squared of the spouses as a proxy for health risk.

Column 1 shows that in rural areas, illness of the spouse is associated with a 1.7 percentage point lower probability of being in employment. This effect comes mainly from men (column 2): for them, illness of the spouse of household head lowers the employment rate by 4.7 percentage points, an 8% reduction compared to the baseline employment rate. In urban areas, illness of the spouse is associated with a weak increase in the employment probability of other members (+1.3 p.p), significant at the 10% threshold.



**Table 3.9** – illness of spouse, other household members, fixed effects

|                 | employed (0/1)         |                        |                       |                       |                       |
|-----------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|
|                 | (1)<br>total           | (2)<br>men             | (3)<br>women          | (4)<br>head           | (5)<br>children       |
| <b>national</b> |                        |                        |                       |                       |                       |
| spouse sick     | -0.00472<br>(0.00484)  | -0.0101<br>(0.00625)   | 0.00745<br>(0.00672)  | -0.00214<br>(0.00774) | -0.00269<br>(0.00618) |
| moy             | 0.464                  | 0.628                  | 0.0867                | 0.747                 | 0.298                 |
| N               | 46360                  | 32365                  | 13995                 | 17219                 | 29141                 |
| <b>rural</b>    |                        |                        |                       |                       |                       |
| spouse sick     | -0.0172**<br>(0.00816) | -0.0465***<br>(0.0146) | -0.00545<br>(0.00702) | -0.00214<br>(0.00774) | -0.00269<br>(0.00618) |
| moy             | 0.227                  | 0.598                  | 0.0318                | 0.747                 | 0.298                 |
| N               | 21582                  | 7450                   | 14132                 | 17219                 | 29141                 |
| <b>urban</b>    |                        |                        |                       |                       |                       |
| spouse sick     | 0.0137*<br>(0.00746)   | 0.0172<br>(0.0133)     | 0.0107<br>(0.00844)   | -0.00214<br>(0.00774) | -0.00269<br>(0.00618) |
| moy             | 0.200                  | 0.393                  | 0.105                 | 0.747                 | 0.298                 |
| N               | 24866                  | 8229                   | 16637                 | 17219                 | 29141                 |

controls omitted, clustered standard errors in parentheses

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

Overall, the results point towards an adverse effect of spousal illness on labor market participation in rural areas. This is consistent with informal caring by other household members.

### 3.6.3 Youth unemployment, inactivity, and head illness

**Unemployment and labour force participation** In the preceding section, we did not distinguish between employed and active. In this section, we take into account the fact that some individuals may be looking for jobs without being able to find one.

Table 3.10 looks at the effect of household head illness on children unemployment and labor force participation, by gender and area of residency. In rural areas, illness of the household head is linked with increased unemployment rates : +2.6 percentage points for men and +1.6 percentage points for women. It is also associated with with increased labor force participation for men (+3.5 p.p.) and women (+1.1 p.p.), although the latter is not statistically significant. In urban areas, illness of the household head has a positive effect on female unemployment (+2 p.p), but is linked with a significant increase in labor force participation both for men and women (+2.4 p.p. and +4.1 p.p. respectively).

**Where do ‘the additional workers’ come from?** What was the previous activity status of these new entrants? In order to investigate the origin of these new entrants, we

**Table 3.10** – unemployment and labour force participation of children, fixed effects

|                 | unemployed             |                       |                        | in labor force         |                        |                        |
|-----------------|------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
|                 | (1)<br>total           | (2)<br>men            | (3)<br>women           | (4)<br>total           | (5)<br>men             | (6)<br>women           |
| <b>national</b> |                        |                       |                        |                        |                        |                        |
| hh head sick    | 0.0175***<br>(0.00498) | 0.0170**<br>(0.00766) | 0.0183***<br>(0.00620) | 0.0279***<br>(0.00551) | 0.0267***<br>(0.00771) | 0.0311***<br>(0.00778) |
| moy             | 0.0928                 | 0.130                 | 0.0534                 | 0.402                  | 0.634                  | 0.156                  |
| N               | 37460                  | 19252                 | 18208                  | 37513                  | 19272                  | 18241                  |
| <b>rural</b>    |                        |                       |                        |                        |                        |                        |
| hh head sick    | 0.0211***<br>(0.00625) | 0.0261**<br>(0.0103)  | 0.0155**<br>(0.00615)  | 0.0221***<br>(0.00786) | 0.0347***<br>(0.0118)  | 0.0115<br>(0.00975)    |
| moy             | 0.0518                 | 0.0822                | 0.0187                 | 0.390                  | 0.691                  | 0.0628                 |
| N               | 16419                  | 8565                  | 7854                   | 16430                  | 8568                   | 7862                   |
| <b>urban</b>    |                        |                       |                        |                        |                        |                        |
| hh head sick    | 0.0141*<br>(0.00734)   | 0.00854<br>(0.0111)   | 0.0199**<br>(0.00955)  | 0.0324***<br>(0.00763) | 0.0237**<br>(0.0103)   | 0.0412***<br>(0.0112)  |
| moy             | 0.125                  | 0.168                 | 0.0798                 | 0.411                  | 0.589                  | 0.227                  |
| N               | 21041                  | 10687                 | 10354                  | 21083                  | 10704                  | 10379                  |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

run the same regressions with three other activity categories as the dependent variable: “student” and “housewife” (for women) and “other inactive”<sup>5</sup>.

The results are shown in table 3.11. For the “student” category, the results are not significant, indicating that to the extent that there is an “added worker effect” in case of illness of the main breadwinner, this does not come at the cost of taking children out of school or studies. Instead, illness of the household head is mostly associated with a decrease in “other inactive” (column 4) in urban as well as in rural areas. Urban women are 2.8 percentage points less likely to declare themselves as housewife when the household head is sick, a 8.4% decrease over the baseline probability. One interpretation of this is that the “added workers” are selected from the household members for whom the opportunity cost of going on the labor market is relatively low.

### 3.6.4 Other coping mechanisms

Shifts in labor supply within the household are not the only mechanism through which households face the adverse economic consequences of illness. In this section, we document other behavioral regularities that are associated with illness in our sample of Moroc-

<sup>5</sup>“Housewife” (*femme au foyer*) is collected as a separate activity status, distinct from simply “inactive”, by the statistical authorities as standard procedure. This does not seem to give rise to problems in interpretation by the respondents.

**Table 3.11** – student, inactive, and housewife status of children, fixed effects

|                 | student                 |                       |                       | other inactive          |                         |                       | housewife             |
|-----------------|-------------------------|-----------------------|-----------------------|-------------------------|-------------------------|-----------------------|-----------------------|
|                 | (1)<br>total            | (2)<br>men            | (3)<br>women          | (4)<br>total            | (5)<br>men              | (6)<br>women          | (7)<br>women          |
| <b>national</b> |                         |                       |                       |                         |                         |                       |                       |
| hh head sick    | -0.00214<br>(0.00364)   | -0.00269<br>(0.00522) | -0.00267<br>(0.00507) | -0.0199***<br>(0.00503) | -0.0251***<br>(0.00657) | -0.0138*<br>(0.00770) | -0.0140<br>(0.00927)  |
| moy             | 0.222                   | 0.244                 | 0.199                 | 0.144                   | 0.119                   | 0.171                 | 0.472                 |
| N               | 37460                   | 19252                 | 18208                 | 37513                   | 19272                   | 18241                 | 18241                 |
| <b>rural</b>    |                         |                       |                       |                         |                         |                       |                       |
| hh head sick    | 0.00000182<br>(0.00479) | 0.00313<br>(0.00684)  | -0.00466<br>(0.00661) | -0.0275***<br>(0.00816) | -0.0421***<br>(0.0108)  | -0.0106<br>(0.0124)   | 0.00365<br>(0.0148)   |
| moy             | 0.144                   | 0.176                 | 0.109                 | 0.150                   | 0.130                   | 0.172                 | 0.655                 |
| N               | 16419                   | 8565                  | 7854                  | 16430                   | 8568                    | 7862                  | 7862                  |
| <b>urban</b>    |                         |                       |                       |                         |                         |                       |                       |
| hh head sick    | -0.00423<br>(0.00523)   | -0.00667<br>(0.00755) | -0.00185<br>(0.00725) | -0.0128**<br>(0.00643)  | -0.0160*<br>(0.00827)   | -0.0109<br>(0.00987)  | -0.0276**<br>(0.0119) |
| moy             | 0.283                   | 0.298                 | 0.268                 | 0.139                   | 0.110                   | 0.170                 | 0.333                 |
| N               | 21041                   | 10687                 | 10354                 | 21083                   | 10704                   | 10379                 | 10379                 |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

can households. This focus on other coping mechanism can be seen as a way to ascertain the validity of the self-declared illness measure : if these measures are associated with behaviors that are typically associated with health shocks, it will strengthen our conviction that self declared illness is an appropriate indicator of such shocks.

Moreover, distinguishing between different types of coping mechanisms is a purveyor of information regarding the welfare costs of illness at the household level. While some mechanism appear relatively benign - e.g. private transfers or sale of durables - others, such as credit, are more ambiguous, as they may lead to over-indebtedness; it may even be downright harmful in the medium term, for instance if medical expenditures are paid for through the sale of business assets or livestock, which may lead to lower earnings in the future.

We examine three such mechanisms: private transfers, credit, and sale of household assets. The receipt of private transfers is considered in columns 1 and 2 of table 3.12, first as an indicator equal to 1 if the household receives any transfers (column 1), and second the logarithm of the value of transfers receipts (column 2). Both are positive and significant, in rural as well as in urban areas. On average, household head illness is associated with a 3.3 percentage point increase in the probability of receiving any transfer, and a 31% increase in the amount received, for the household who received transfers.

The second coping mechanism that we examine is credit and debt. We examine the impact of head illness on a dummy equal to one if the household has taken on at least

**Table 3.12** – coping mechanisms and illness of household head, all other members, fixed effects

|                 | (1)                    | (2)                    | (3)                    | (4)                  | (5)                 | (6)                   |
|-----------------|------------------------|------------------------|------------------------|----------------------|---------------------|-----------------------|
|                 | transf. (0/1)          | transf. (ln DH)        | new credit (0/1)       | # credits            | debt (ln DH)        | wealth index          |
| <b>national</b> |                        |                        |                        |                      |                     |                       |
| hh head sick    | 0.0345***<br>(0.00415) | -0.0218<br>(0.0190)    | 0.0658***<br>(0.00412) | 0.143***<br>(0.0218) | 0.334***<br>(0.108) | -0.00835<br>(0.00672) |
| Observations    | 81028                  | 17177                  | 81028                  | 31936                | 7031                | 53719                 |
| <b>rural</b>    |                        |                        |                        |                      |                     |                       |
| hh head sick    | 0.0249***<br>(0.00699) | 0.143***<br>(0.0477)   | 0.0586***<br>(0.00643) | 0.162***<br>(0.0341) | 0.105<br>(0.207)    | -0.0154<br>(0.0121)   |
| Observations    | 29580                  | 5024                   | 29580                  | 11418                | 2081                | 19595                 |
| <b>urban</b>    |                        |                        |                        |                      |                     |                       |
| hh head sick    | 0.0380***<br>(0.00642) | -0.0647***<br>(0.0227) | 0.0702***<br>(0.00645) | 0.122***<br>(0.0321) | 0.512***<br>(0.179) | -0.00939<br>(0.00960) |
| Observations    | 33920                  | 8773                   | 33920                  | 13730                | 3399                | 22458                 |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

one new credit in the past year (column 3), on the number of outstanding credits (column 4), and on the value of outstanding debt (column 5)<sup>6</sup>. Here again, most of the results are positive and significant (except for the amount of debt in rural areas). Illness of the household head is associated with an increase of 6.6 percentage points in the probability of taking on a new credit, with 0.14 new credit taken, and for an increase of 33% in the amount of outstanding debt for household that previously had such debt.

One final way through which households smooth consumption in the face of illness is by drawing down on previously accumulated savings. In a context of incomplete bancarization, savings are often conducted through the purchase of semi-liquid assets and/or livestock in rural areas (Genoni, 2012). We examine the effect of illness on an index of household durables constructed through PCA (column 6). The coefficients are negative, but not statistically significant.

## 3.7 Mechanisms and robustness

### 3.7.1 Mechanisms: interaction with health insurance

The estimates presented in section 3.6.2 point towards frequent labor reallocation within the household, in the form of previously inactive household members becoming employed in case of illness of the main breadwinner. While these results are robust to time-invariant unobserved factors at the individual level, including (presumably) personality traits such as diligence or laziness, and control for various household characteristics, they

<sup>6</sup>For technical and administrative reasons, data is missing for the 2013 wave for the last two indicators (total number of credit and total household debt), explaining the lower number of observations.

might be driven by a reverse causality mechanism, of household head becoming ill (or declaring themselves to be ill) because of the activity status of other household members.

While not a test against reverse causality *per se*, in this subsection we present evidence in favor of our preferred mechanism, namely that the link between household head illness and activity of other members is driven by labor reallocation for consumption insurance reasons. We do this through two interaction tests. First, we interact illness of the household head with his health insurance status. If the labor reallocation is driven by insurance mechanisms, we should observe that households that are covered by formal health insurance (typically reserved for civil servants or employees of the formal private sector) resort less often to such coping mechanisms. Additionally, labor reallocation should concern those household members that had a low initial opportunity cost of time. We use education as a proxy of opportunity cost of time, that we interact with the household head shock variable. The added worker mechanism should manifest itself through a negative interaction term.

Table 3.13 shows the results of the interaction of head illness with a variable equal to one if the household is covered by formal health insurance. Health insurance is obtained through one's job; it concerns civil servants as well as employees of the (formal) private sector since 2005. Independents and agricultural workers are exempt, and there is frequent evasion or partial coverage in small businesses and the informal sector (Banque Mondiale et HCP, 2017). One affiliate to formal health insurance is allowed to cover his dependents (wife and minor children) as well as in certain cases his parents and major children provided they are students.

The effect of the interaction between health illness and formal insurance is negative, and significant at the 10% level at the national level for both sexes. Again, the effect is driven by urban areas, and especially by women, reflecting the very low proportion of rural sector residents who are covered by formal health insurance. The coefficients are equal in magnitude to those for household head illness, but of opposite sign: this suggests that only household that are not covered by formal health insurance resort to "added worker" mechanism.

The second interaction test is displayed in table 3.14. We interact the health shock variable with the education level of the respondent, equal to one if the individual has at least education at high school level. These individuals should have a higher opportunity cost of time, and their labor supply should be less responsive to the health of the main breadwinner. Consistent with this interpretation, the interaction term is positive, but generally not significant, which could be due to a small cell size.

In summary, interaction tests are consistent with the positive effect of household head on labor supply being driven by insurance mechanisms, while we cannot find evidence

**Table 3.13** – head illness, interaction with health insurance, all other members, fixed effects

|                              | employed (0/1)      |                   |                      |
|------------------------------|---------------------|-------------------|----------------------|
|                              | (1)<br>total        | (2)<br>men        | (3)<br>women         |
| <b>national</b>              |                     |                   |                      |
| head sick                    | 0.00964** (0.00377) | 0.00785 (0.00742) | 0.0113*** (0.00379)  |
| head sick × health insurance | -0.0120* (0.00692)  | -0.00221 (0.0139) | -0.0197*** (0.00703) |
| Observations                 | 70124               | 27304             | 42820                |
| <b>rural</b>                 |                     |                   |                      |
| head sick                    | 0.00212 (0.00495)   | 0.000371 (0.0101) | 0.00313 (0.00436)    |
| head sick × health insurance | -0.00230 (0.0141)   | 0.0252 (0.0317)   | -0.0197* (0.0115)    |
| Observations                 | 31708               | 12516             | 19192                |
| <b>urban</b>                 |                     |                   |                      |
| head sick                    | 0.0192*** (0.00582) | 0.0181 (0.0111)   | 0.0201*** (0.00634)  |
| head sick × health insurance | -0.0209** (0.00860) | -0.0135 (0.0169)  | -0.0258*** (0.00911) |
| Observations                 | 38416               | 14788             | 23628                |

controls omitted, clustered standard errors in parentheses

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

that the labor supply of individuals with high opportunity cost are less responsive to illness of the main breadwinner. This provides some partial evidence that our results are not driven by reverse causality. In the next subsection, we test the robustness of our effects against the possibility of measurement error.

### 3.7.2 Different indicators of health shock

Another concern regarding the definition of our health shock is the possibility of measurement error, a serious concern with self-reported illness. In this section, we consider several alternative indicators of illness shock to verify that our main effect does not depend on the precise definition of illness used. Specifically, we consider separately the two subcategories of the self-defined illness measure: temporary and chronic illness. Additionally, we consider the impact on the labor supply of hospitalization of the household head and spouse (defined as an inpatient episode of at least one night). Presumably, hospitalization is more salient than an average sickness episode and less subject to recall bias or variation in interpretation. Finally, we test the effect on other members' labor supply of the death of the household head or the spouse. In our context, death can be seen as an extreme health shock that does not suffer from ambivalence in interpretation.

The results for the household head are displayed in table 3.15, by gender and area of residency. The coefficients for chronic illness (column 3 and 4) are positive at the national level for women and men (although the coefficient for men is significant at the

**Table 3.14** – head illness, interaction with education of respondent

|                        | employed (0/1)         |                      |                        |
|------------------------|------------------------|----------------------|------------------------|
|                        | (1)<br>total           | (2)<br>men           | (3)<br>women           |
| <b>national</b>        |                        |                      |                        |
| head sick              | 0.00847**<br>(0.00414) | 0.00606<br>(0.00661) | 0.0109**<br>(0.00477)  |
| head sick × higher ed. | -0.00455<br>(0.0144)   | 0.0127<br>(0.0215)   | -0.0224<br>(0.0190)    |
| Observations           | 52606                  | 27034                | 25572                  |
| <b>rural</b>           |                        |                      |                        |
| head sick              | 0.00153<br>(0.00597)   | 0.00646<br>(0.00976) | -0.00517<br>(0.00583)  |
| head sick × higher ed. | -0.0429<br>(0.0310)    | -0.0875*<br>(0.0477) | 0.0503<br>(0.0323)     |
| Observations           | 23996                  | 12467                | 11529                  |
| <b>urban</b>           |                        |                      |                        |
| head sick              | 0.0153***<br>(0.00580) | 0.00819<br>(0.00904) | 0.0224***<br>(0.00722) |
| head sick × higher ed. | -0.00505<br>(0.0162)   | 0.0288<br>(0.0240)   | -0.0408*<br>(0.0215)   |
| Observations           | 28610                  | 14567                | 14043                  |

fixed effects estimation, controls omitted, clustered standard errors in parentheses higher education : high school level or higher \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

10% level only), representing respectively an increase in +0.9 percentage points and +1.7 percentage points of the probability of being employed. The effect is driven by urban areas residents (+2.4 p.p for men and +1.3 p.p. for women). Temporary illness (column 1 and 2) is not statistically significant in either area, nor is hospitalization (column 5 and 6). Finally, death of the household head is associated with a 5 percentage points increase in the probability of the women being employed, but is not statistically significant for men.

These results provide some support for the mechanism of labor reallocation within the household as a response to parental health: the effect goes in the same direction in the case of death (an extreme health shock) and chronic illness. On the other hand, some of these result appear to contradict one another. The difference in the size and significance of effects between rural and urban areas is not necessarily problematic, as the population and labor markets in the countryside differ markedly from the ones in cities. The fact that chronic illness is significant and not hospitalization might appear surprising. However, it is consistent with national statistics showing that medications and medical goods represent the first expenditure item on health, at 40% of direct health expenditure. Together with outpatient care and medical tests, they represent 78% of direct

**Table 3.15** – Different illness indicators of household head, all other members, by gender, fixed effects

|                        | employed (0/1)       |                      |                      |                        |                      |                      |                      |                       |
|------------------------|----------------------|----------------------|----------------------|------------------------|----------------------|----------------------|----------------------|-----------------------|
|                        | (1)<br>men           | (2)<br>women         | (3)<br>men           | (4)<br>women           | (5)<br>men           | (6)<br>women         | (7)<br>men           | (8)<br>women          |
| <b>national</b>        |                      |                      |                      |                        |                      |                      |                      |                       |
| head temporary illness | -0.0276*<br>(0.0151) | 0.00484<br>(0.00686) |                      |                        |                      |                      |                      |                       |
| head chronic illness   |                      |                      | 0.0170*<br>(0.00901) | 0.00886**<br>(0.00442) |                      |                      |                      |                       |
| head hospitalization   |                      |                      |                      |                        | -0.00273<br>(0.0137) | 0.00651<br>(0.00607) |                      |                       |
| death of hh head       |                      |                      |                      |                        |                      |                      | -0.0252<br>(0.0327)  | 0.0502**<br>(0.0203)  |
| Observations           | 19544                | 35295                | 19544                | 35295                  | 19517                | 35233                | 19544                | 35295                 |
| <b>rural</b>           |                      |                      |                      |                        |                      |                      |                      |                       |
| head temporary illness | -0.0142<br>(0.0241)  | 0.00824<br>(0.00803) |                      |                        |                      |                      |                      |                       |
| head chronic illness   |                      |                      | 0.00698<br>(0.0138)  | 0.00206<br>(0.00576)   |                      |                      |                      |                       |
| head hospitalization   |                      |                      |                      |                        | 0.0233<br>(0.0227)   | 0.00335<br>(0.00725) |                      |                       |
| death of hh head       |                      |                      |                      |                        |                      |                      | -0.0442<br>(0.0558)  | 0.00429<br>(0.0298)   |
| Observations           | 8622                 | 15438                | 8622                 | 15438                  | 8612                 | 15407                | 8622                 | 15438                 |
| <b>urban</b>           |                      |                      |                      |                        |                      |                      |                      |                       |
| head temporary illness | -0.0234<br>(0.0195)  | 0.00290<br>(0.0104)  |                      |                        |                      |                      |                      |                       |
| head chronic illness   |                      |                      | 0.0237**<br>(0.0119) | 0.0130**<br>(0.00639)  |                      |                      |                      |                       |
| head hospitalization   |                      |                      |                      |                        | -0.0183<br>(0.0172)  | 0.00819<br>(0.00852) |                      |                       |
| death of hh head       |                      |                      |                      |                        |                      |                      | -0.00934<br>(0.0406) | 0.0791***<br>(0.0275) |
| Observations           | 10922                | 19857                | 10922                | 19857                  | 10905                | 19826                | 10922                | 19857                 |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
chronic illness and temporary illness : self declared. hospitalization : at least one night inpatient



health expenditure in 2013 (Ministère de la Santé, 2015). By contrast, inpatient hospital care represented only 11.8% of direct health payments.

Table 3.16 presents results of the regression of the children’s employment according to different indicators of the spouse’s illness. The effect of temporary illness is insignificant, while the effects of chronic illness, hospitalization, and death of the spouse of the household head are negative and significant for men. Chronic illness in the spouse is associated with a 2 percentage points decrease of the male children employment rate, driven by the effect in rural areas (-3.6 p.p.). Similarly, hospitalization is linked to a 3 percentage points decrease in employment of the male children. Finally, death of the spouse is linked to a decrease of employment for both male and female children : -6.9 and -7 percentage points respectively. The fact that the sign and significance pattern of the effect is consistent across different measures of health shock is indicative that measurement error is not likely to be a big concern. However, the fact that the effect size is biggest in the case of death is somewhat at odds with the interpretation that these reflect the impact of “caring” for an ill parent. It is, however, consistent with a mechanism in which the wife of the household head is specialized in household production duties that have to be taken up by someone else in the household in the case of illness or death.

The next section presents an additional test of the robustness of our results.

### 3.7.3 Additional robustness tests

**Bad controls** The main specification of our regression did include the size as well as the structure of the household as controls, as such variables may be considered as confounders of the causal relation between head illness and individual labor supply. But on the other hand, they may as well be mediators in the relation between head illness and individual labor supply. Head illness may cause a change in the structure of the household, which may in turn cause the individual to go on the labor market. The inclusion of these “bad controls” (Angrist and Pischke, 2009) may bias the relation between our independent variable and the outcome of interest.

We take an agnostic stance on this issue, and re-estimate our models with and without the inclusion of the possible “bad controls”. The results, presented in table 3.A.6 in the appendix, show no change in the sign, magnitude or significance of our coefficients.

**Strict exogeneity and feedback effects** In our empirical model (equation 3.4), what allows us to identify the various  $\beta_{1k}$  parameters is the assumption of strict exogeneity of the  $u_{it}$  errors (Wooldridge, 2010):

$$E[u_{it}|x_{i1}, x_{i2}, \dots, x_{iT}, \delta_i] = 0$$

**Table 3.16** – Different illness indicators of spouse, all other members, by gender, fixed effects

|                          | employed (0/1)       |                     |                         |                      |                        |                      |                       |                       |
|--------------------------|----------------------|---------------------|-------------------------|----------------------|------------------------|----------------------|-----------------------|-----------------------|
|                          | (1)<br>men           | (2)<br>women        | (3)<br>men              | (4)<br>women         | (5)<br>men             | (6)<br>women         | (7)<br>men            | (8)<br>women          |
| <b>national</b>          |                      |                     |                         |                      |                        |                      |                       |                       |
| spouse temporary illness | 0.00365<br>(0.0103)  | 0.00130<br>(0.0132) |                         |                      |                        |                      |                       |                       |
| spouse chronic illness   |                      |                     | -0.0195***<br>(0.00699) | 0.00772<br>(0.00732) |                        |                      |                       |                       |
| spouse hospitalization   |                      |                     |                         |                      | -0.0296***<br>(0.0107) | 0.0187<br>(0.0122)   |                       |                       |
| death of spouse of head  |                      |                     |                         |                      |                        |                      | -0.0691**<br>(0.0294) | -0.0703**<br>(0.0322) |
| Observations             | 37161                | 21483               | 37161                   | 21483                | 32365                  | 13996                | 37161                 | 21483                 |
| <b>rural</b>             |                      |                     |                         |                      |                        |                      |                       |                       |
| spouse temporary illness | -0.00949<br>(0.0160) | -0.0179<br>(0.0160) |                         |                      |                        |                      |                       |                       |
| spouse chronic illness   |                      |                     | -0.0360***<br>(0.0111)  | 0.00147<br>(0.00944) |                        |                      |                       |                       |
| spouse hospitalization   |                      |                     |                         |                      | -0.0324*<br>(0.0173)   | -0.00554<br>(0.0158) |                       |                       |
| death of spouse of head  |                      |                     |                         |                      |                        |                      | -0.143***<br>(0.0380) | -0.0445<br>(0.0382)   |
| Observations             | 16430                | 8748                | 16430                   | 8748                 | 14898                  | 6619                 | 16430                 | 8748                  |
| <b>urban</b>             |                      |                     |                         |                      |                        |                      |                       |                       |
| spouse temporary illness | 0.0207<br>(0.0130)   | 0.0198<br>(0.0213)  |                         |                      |                        |                      |                       |                       |
| spouse chronic illness   |                      |                     | -0.00746<br>(0.00896)   | 0.0115<br>(0.0108)   |                        |                      |                       |                       |
| spouse hospitalization   |                      |                     |                         |                      | -0.0263*<br>(0.0135)   | 0.0321*<br>(0.0169)  |                       |                       |
| death of spouse of head  |                      |                     |                         |                      |                        |                      | 0.0200<br>(0.0448)    | -0.0913*<br>(0.0494)  |
| Observations             | 20731                | 12735               | 20731                   | 12735                | 17467                  | 7377                 | 20731                 | 12735                 |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Conditional on covariates in all periods and on the time-invariant unobserved heterogeneity, the distribution of shocks to the individual's labor market participation is as good as random. In particular, this assumption requires that there are no feedback effects from an individual's labor supply in one period to its own health, or to the health of other household members. Yet, we can think of several instances where such feedback effects might be present, for instance if bad work conditions cause a degradation in health; or, alternatively, if additional revenues allow better nutrition or preventive care for all family members, reducing the likelihood of a health event in the next period. Under failures of the strict exogeneity assumption, fixed effect estimates will be biased and inconsistent.

As a first check that our results are robust to such forms of exogeneity failure, we rerun our main models, the cross-effects of household head and spouse illness on the employment of other household members, using a first-difference specification instead of the fixed effects that we have used up until here. Under strict exogeneity, both estimators are consistent, but fixed effects is more efficient. Finding an important difference between fixed and random effects estimators would be an indication of failure of the strict exogeneity assumption.

The results for household head illness are presented in appendix table 3.A.8, broken down by residency and sex of the respondent. We present side by side the result of fixed effects (FE) and first difference (FD) specification of our models. When considering men and women together (top panel), the results appear similar, both in significance and in magnitude. However, when looking at genders separately, the coefficient for men become significant in urban areas, as well as (weakly) overall. This is strange, given that first differences is less efficient than fixed effects, and lead us to suspect that the strict exogeneity assumption is violated in those cases<sup>7</sup>.

To formally test for strict exogeneity failure, we implement the test simple test proposed by Wooldridge (2010), adding the future value of the right-hand side variable of interest to the fixed effect specification, and testing against the null that this variable is equal to zero. the result of this test is displayed in appendix table 3.A.10 for the case of the household head. The result confirm our intuition that strict exogeneity is violated in the case of urban male, where the coefficient is negative and significant. The result of a similar test in the case of illness of the spouse is displayed in table ???. In this case, we fail to reject strict exogeneity. Of course, failure to reject could be due to low statistical power.

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<sup>7</sup>The coefficient for women lose significance when going from fixed effects to first differences, but this is to be expected for reasons of less statistical power from FD.

**Subgroup analysis and multiple testing** Our main conclusion rests on the separate estimation of models on different subgroups: men and women, inhabitants of rural and urban areas, and all the interactions. By testing these models separately, we take the risk of having one or several of our results being false positives due to multiple hypothesis testing (Sun et al., 2014). In order to take this into account, we re-estimate our main model by interacting our variable of interest (household head illness) with dummies for gender and residency; we then perform pairwise comparisons for our various subgroups between the case when the head of illness is sick and when he is not, adjusting for multiple comparison. Appendix table 3.A.11 displays the result of one of such comparisons of margins, using Sidak's adjustment, a less conservative method than the Bonferroni correction<sup>8</sup> The main result persist, even taking into account multiple testing.

### 3.8 Conclusion

Recent studies about consumption and illness in developing countries tend to conclude to full insurance, i.e. an absence of drop in consumption following episodes of illness, in contrast to previous generation studies that showed that consumption was imperfectly insured against illness. This does not imply that illness has no impact on the welfare of households, and that there is no welfare gain from the extension of formal health insurance. Households may preserve their consumption through coping mechanisms that are very costly in terms of current welfare and that may endanger their future earnings. Hence the need to look into detail into what kind of coping mechanisms are used and when.

One channel through which households mitigate the economic impacts of ill health is through labour reallocation within the household. Previously inactive household members may be induced to go on the labour market to compensate for the earning losses linked with the illness of an economically active household member. This “added worker effect” has been hypothesised to be an element of social change, as it may challenge existing gender roles; however its efficiency as a coping mechanism may be limited if job opportunities are scarce.

In this paper, we exploit a new panel data set from Morocco, to examine coping mechanisms and within-household labour supply reallocation following a health shock. In this branch of the literature, countries of the Middle East and North Africa region (MENA) have not been studied extensively, despite economic, social and cultural specificities that

<sup>8</sup>In Sidak's adjustment, the critical value for rejection is adjusted based on the probability of making a type I error: the adjusted  $p$ -value is  $1 - (1 - p_u)^N$ , where  $p_u$  is the unadjusted  $p$ -value and  $N$  is the number of tests performed (?).

may render the conclusions of studies done in other context inapplicable here.

Our descriptive statistics show that household income is apparently only weakly affected by illness of the household head, and that household consumption appears totally unrelated to illness status. At the same time, illness of the household head is associated with important changes in the labor market status of household members, especially among children of the household head. Specifically, the number of other household members active on the labour market increases, and the number of students and ‘housewives’ decreases.

Using panel data and individual fixed effects models, we estimate the effect of the illness of the household head and the spouse on the labour market status of other members. We find that illness of the head is linked to an increased labour-searching activity of children, as measured by unemployment. Only for urban women is the illness of the household head associated with an effective increase in employment. Our results also show that illness of the spouse is associated with a decrease in total household income, even though the overwhelming majority of spouses in our sample is listed as inactive. We explore one potential explanation for this paradox: illness of the spouse is associated with lower employment rate of children, especially for sons in rural area, which could reflect the necessity of caring for an ill parent in contexts where the healthcare supply is sparse. Thus, labour reallocation may go in different directions depending on who, in the household, is ill.

Where do the additional workers come from? While descriptive statistics showed that illness of the head was associated with lower likelihood of being a student for the sons and daughters, this correlation disappears when controlling for household characteristics and individual inobservables. Overall, the additional workers come mostly from women who previously defined themselves as ‘housewives’, who presumably have a low opportunity cost of going on the labor market.

Other coping mechanisms are used as well: private transfers receipts increase in the case of illness of the household head; but households also rely on credit to ease the burden of health shocks. Rural households do not seem to sell livestock or flock; for urban households, there is limited evidence of a decrease in household durables concurrently to illness of the head.

Overall, these results paint a moderately optimistic picture of the ability of Moroccan households to deal with the economic consequences of illness. Consumption levels are preserved through a combination of additional work that is not done to the detriment of studies, as well as a through private transfers and credit. The former is *a priori* relatively benign; only the latter could have adverse consequences if it leads to overindebtedness.

The overall picture of relatively good protection may hide heterogeneous effects be-

tween subgroups. In particular, our paper illustrates that rural households are systematically worse off than their fellow citizens living in urban areas: illness is associated with a bigger drop in household income, there are fewer opportunities for reallocation of labour, and the households may experience a “double whammy” one child has to stay at home to provide informal care for the sick parent. That rural households are disadvantaged compared to urban ones is hardly news, but bears repeating nonetheless.

Finally, the results presented in this paper shed some light on the nature of the labour market in Morocco. The country, and the MENA region in general, is notorious for its high youth unemployment rate, which has given rise to different interpretations. The results presented here are consistent with a prevalence of involuntary unemployment and exclusion of the youth from the economy, at least for rural residents and for urban males: in situation of need, these individuals go to the labour market, but remain mostly unemployed. Only for women in cities is the illness of the head accompanied by increased employment. This could mean that female inactivity is the result of a choice rather than a constraint, which in turns reflects the high disutility - in the form of bad working conditions or extremely low earning opportunities - that work represents for these women.

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# Appendices

## 3.A Additional tables

**Table 3.A.1** – Covariates by illness of household head, men, 2012

|                            | rural      |             |           | urbain     |             |           |
|----------------------------|------------|-------------|-----------|------------|-------------|-----------|
|                            | no illness | any illness | diff.     | no illness | any illness | diff.     |
| <b>men</b>                 |            |             |           |            |             |           |
| age                        | 26.08      | 27.78       | -1.69***  | 26.04      | 28.70       | -2.66***  |
| hh size                    | 7.24       | 7.72        | -0.48***  | 5.95       | 6.01        | -0.06     |
| # women in hh              | 3.11       | 3.36        | -0.25***  | 2.50       | 2.69        | -0.19***  |
| # children                 | 0.81       | 0.87        | -0.06     | 0.42       | 0.45        | -0.04     |
| # youth                    | 0.83       | 0.72        | 0.11**    | 0.47       | 0.40        | 0.07***   |
| # elderly                  | 0.41       | 0.65        | -0.24***  | 0.31       | 0.52        | -0.22***  |
| literate                   | 0.770      | 0.740       | 0.030*    | 0.943      | 0.940       | 0.003     |
| health insurance coverage  | 0.054      | 0.047       | 0.007     | 0.242      | 0.201       | 0.041***  |
| marital status             |            |             |           |            |             |           |
| -single                    | 0.777      | 0.721       | 0.057***  | 0.879      | 0.820       | 0.060***  |
| -married                   | 0.213      | 0.261       | -0.048*** | 0.111      | 0.167       | -0.056*** |
| -widow/er                  | 0.006      | 0.006       | -0.000    | 0.005      | 0.005       | -0.000    |
| -divorced                  | 0.003      | 0.012       | -0.009*** | 0.005      | 0.009       | -0.004    |
| schooling level            |            |             |           |            |             |           |
| -none                      | 0.247      | 0.283       | -0.036*   | 0.067      | 0.069       | -0.002    |
| -primary                   | 0.584      | 0.565       | 0.019     | 0.230      | 0.303       | -0.073*** |
| -lower secondary           | 0.271      | 0.270       | 0.001     | 0.303      | 0.290       | 0.013     |
| -upper secondary           | 0.109      | 0.113       | -0.005    | 0.284      | 0.249       | 0.035**   |
| -higher ed.                | 0.037      | 0.052       | -0.015*   | 0.183      | 0.159       | 0.024*    |
| relation to hh head        |            |             |           |            |             |           |
| -child (or child's spouse) | 0.905      | 0.913       | -0.008    | 0.877      | 0.909       | -0.033*** |
| -grandchild                | 0.019      | 0.040       | -0.021*** | 0.012      | 0.038       | -0.026*** |
| -(step-)father/mother      | 0.017      | 0.011       | 0.006     | 0.017      | 0.005       | 0.013***  |
| Observations               | 2957       |             |           | 3808       |             |           |

**Table 3.A.2** – Covariates by illness of household head, women, 2012

|                            | no illness | rural<br>any illness | diff.     | no illness | urbain<br>any illness | diff.     |
|----------------------------|------------|----------------------|-----------|------------|-----------------------|-----------|
| <b>women</b>               |            |                      |           |            |                       |           |
| age                        | 30.19      | 29.28                | 0.91      | 31.10      | 30.89                 | 0.20      |
| hh size                    | 7.28       | 7.64                 | -0.35**   | 5.88       | 5.90                  | -0.03     |
| # women in hh              | 4.02       | 4.08                 | -0.06     | 3.43       | 3.50                  | -0.06     |
| # children                 | 0.91       | 0.96                 | -0.05     | 0.45       | 0.43                  | 0.02      |
| # youth                    | 0.87       | 0.70                 | 0.16***   | 0.50       | 0.43                  | 0.07***   |
| # elderly                  | 0.51       | 0.71                 | -0.19***  | 0.41       | 0.58                  | -0.17***  |
| literate                   | 0.503      | 0.507                | -0.004    | 0.790      | 0.819                 | -0.030**  |
| health insurance coverage  | 0.047      | 0.048                | -0.001    | 0.223      | 0.225                 | -0.002    |
| marital status             |            |                      |           |            |                       |           |
| -single                    | 0.612      | 0.582                | 0.029     | 0.735      | 0.694                 | 0.041***  |
| -married                   | 0.254      | 0.319                | -0.065*** | 0.130      | 0.196                 | -0.067*** |
| -widow/er                  | 0.108      | 0.063                | 0.045***  | 0.101      | 0.049                 | 0.052***  |
| -divorced                  | 0.026      | 0.036                | -0.009    | 0.035      | 0.061                 | -0.026*** |
| schooling level            |            |                      |           |            |                       |           |
| -none                      | 0.503      | 0.523                | -0.020    | 0.220      | 0.186                 | 0.034**   |
| -primary                   | 0.784      | 0.795                | -0.011    | 0.352      | 0.375                 | -0.023    |
| -lower secondary           | 0.125      | 0.113                | 0.012     | 0.212      | 0.209                 | 0.003     |
| -upper secondary           | 0.066      | 0.066                | 0.000     | 0.255      | 0.257                 | -0.002    |
| -higher ed.                | 0.025      | 0.026                | -0.001    | 0.180      | 0.159                 | 0.021     |
| relation to hh head        |            |                      |           |            |                       |           |
| -child (or child's spouse) | 0.769      | 0.841                | -0.072*** | 0.751      | 0.837                 | -0.085*** |
| -grandchild                | 0.015      | 0.043                | -0.028*** | 0.010      | 0.037                 | -0.027*** |
| -(step-)father/mother      | 0.118      | 0.056                | 0.062***  | 0.101      | 0.036                 | 0.065***  |
| Observations               | 2806       |                      |           | 3759       |                       |           |

**Table 3.A.3** – baseline: own illness, fixed effect, by residency

|               | employed (0/1) |              | hours worked |              | own income (ln) |              | total household income (ln) |              |
|---------------|----------------|--------------|--------------|--------------|-----------------|--------------|-----------------------------|--------------|
|               | (1)<br>rural   | (2)<br>urban | (3)<br>rural | (4)<br>urban | (5)<br>rural    | (6)<br>urban | (7)<br>rural                | (8)<br>urban |
| any illness   | -0.035***      | -0.017***    | 0.065        | 0.052        | -0.065          | 0.017        | -0.121***                   | -0.061***    |
| age           | 0.028***       | 0.018***     | 0.638*       | 0.275        | -0.004          | -0.010       | 0.012*                      | 0.012**      |
| age squared   | -0.000***      | -0.000***    | -0.005*      | -0.003       | 0.000           | 0.000        | -0.000**                    | -0.000***    |
| hh size       | -0.005         | -0.008*      | -0.287       | 0.229        | -0.004          | -0.011       | 0.135***                    | 0.157***     |
| # women in hh | 0.002          | 0.003        | 0.436        | -0.984       | 0.058           | -0.034       | -0.053***                   | -0.073***    |
| # children    | -0.002         | 0.006        | 0.008        | 0.332        | -0.030          | -0.083*      | -0.112***                   | -0.104***    |
| # youth       | 0.003          | 0.003        | -0.170       | 0.833        | 0.059           | -0.027       | -0.045***                   | -0.060***    |
| # elderly     | -0.011         | 0.016**      | 0.748        | 0.909        | -0.016          | -0.076       | 0.004                       | -0.008       |
| Constant      | -0.141         | -0.285       | 29.757***    | 40.081***    | 9.204***        | 10.521***    | 9.431***                    | 9.428***     |
| moy           | 0.372          | 0.341        | 46.066       | 45.038       | 9.688           | 10.075       | 10.193                      | 10.643       |
| N             | 32787          | 43163        | 9212         | 12596        | 5837            | 5155         | 32704                       | 42963        |
| vce           | cluster        | cluster      | cluster      | cluster      | cluster         | cluster      | cluster                     | cluster      |

region\*year interactions omitted

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

**Table 3.A.4** – illness of household head, different outcomes, fixed effects, by detailed illness status

|                 | employed (0/1) |        | hours worked |        | own income (ln) |        | total household income (ln) |        |
|-----------------|----------------|--------|--------------|--------|-----------------|--------|-----------------------------|--------|
|                 | (1)            |        | (2)          |        | (3)             |        | (4)                         |        |
| <b>national</b> |                |        |              |        |                 |        |                             |        |
| head illness    |                |        |              |        |                 |        |                             |        |
| - temp/acute    | -0.00354       | (0.01) | -1.795*      | (1.06) | -0.304**        | (0.13) | -0.0712***                  | (0.02) |
| - chronic       | 0.0117**       | (0.00) | 0.118        | (0.63) | -0.0546         | (0.06) | -0.0691***                  | (0.01) |
| - other         | 0.0270         | (0.02) | 0.911        | (2.35) | -0.131          | (0.24) | -0.00107                    | (0.06) |
| N               | 54750          |        | 10347        |        | 3792            |        | 54565                       |        |
| <b>rural</b>    |                |        |              |        |                 |        |                             |        |
| head illness    |                |        |              |        |                 |        |                             |        |
| - temp/acute    | -0.00354       | (0.01) | -1.795*      | (1.06) | -0.304**        | (0.13) | -0.0712***                  | (0.02) |
| - chronic       | 0.0117**       | (0.00) | 0.118        | (0.63) | -0.0546         | (0.06) | -0.0691***                  | (0.01) |
| - other         | 0.0270         | (0.02) | 0.911        | (2.35) | -0.131          | (0.24) | -0.00107                    | (0.06) |
| N               | 54750          |        | 10347        |        | 3792            |        | 54565                       |        |
| <b>urban</b>    |                |        |              |        |                 |        |                             |        |
| head illness    |                |        |              |        |                 |        |                             |        |
| - temp/acute    | -0.00354       | (0.01) | -1.795*      | (1.06) | -0.304**        | (0.13) | -0.0712***                  | (0.02) |
| - chronic       | 0.0117**       | (0.00) | 0.118        | (0.63) | -0.0546         | (0.06) | -0.0691***                  | (0.01) |
| - other         | 0.0270         | (0.02) | 0.911        | (2.35) | -0.131          | (0.24) | -0.00107                    | (0.06) |
| N               | 54750          |        | 10347        |        | 3792            |        | 54565                       |        |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3.A.5** – detailed illness of spouse, other household members, fixed effects

|                   | employed (0/1) |           |            |           |              |           |
|-------------------|----------------|-----------|------------|-----------|--------------|-----------|
|                   | (1)<br>total   |           | (2)<br>men |           | (3)<br>women |           |
| <b>national</b>   |                |           |            |           |              |           |
| illness of spouse |                |           |            |           |              |           |
| - temp/acute      | 0.00376        | (0.00847) | 0.00515    | (0.0104)  | 0.000259     | (0.0133)  |
| - chronic         | -0.00673       | (0.00550) | -0.0145**  | (0.00718) | 0.0101       | (0.00755) |
| - other           | -0.0866        | (0.0556)  | -0.0939    | (0.0679)  | -0.0860      | (0.0871)  |
| moy               | 0.464          |           | 0.628      |           | 0.0867       |           |
| N                 | 46360          |           | 32365      |           | 13995        |           |
| <b>rural</b>      |                |           |            |           |              |           |
| illness of spouse |                |           |            |           |              |           |
| - temp/acute      | -0.0131        | (0.0123)  | -0.0316    | (0.0269)  | -0.0102      | (0.0102)  |
| - chronic         | -0.0187**      | (0.00877) | -0.0517*** | (0.0164)  | -0.00377     | (0.00747) |
| - other           | 0.00899        | (0.0693)  | 0.0252     | (0.215)   | -0.00612     | (0.0104)  |
| moy               | 0.227          |           | 0.598      |           | 0.0318       |           |
| N                 | 21582          |           | 7450       |           | 14132        |           |
| <b>urban</b>      |                |           |            |           |              |           |
| illness of spouse |                |           |            |           |              |           |
| - temp/acute      | 0.0186         | (0.0116)  | 0.0192     | (0.0262)  | 0.0144       | (0.0119)  |
| - chronic         | 0.0129         | (0.00793) | 0.0174     | (0.0144)  | 0.00984      | (0.00898) |
| - other           | -0.0176        | (0.0496)  | -0.0532    | (0.100)   | -0.00149     | (0.0544)  |
| moy               | 0.200          |           | 0.393      |           | 0.105        |           |
| N                 | 24866          |           | 8229       |           | 16637        |           |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3.A.6** – Robustness to bad controls

|                 | with hh struct. controls |                    | w/o hh struct. controls |                    |
|-----------------|--------------------------|--------------------|-------------------------|--------------------|
|                 | (1)<br>men               | (2)<br>women       | (3)<br>men              | (4)<br>women       |
| <b>national</b> |                          |                    |                         |                    |
| hh head sick    | 0.00718 (0.00639)        | 0.00881* (0.00471) | 0.00693 (0.00639)       | 0.00866* (0.00470) |
| moy             | 0.361                    | 0.0741             | 0.361                   | 0.0741             |
| N               | 27034                    | 25572              | 27034                   | 25572              |
| vce             | cluster                  | cluster            | cluster                 | cluster            |
| <b>rural</b>    |                          |                    |                         |                    |
| hh head sick    | 0.00336 (0.00964)        | -0.00376 (0.00574) | 0.00347 (0.00966)       | -0.00372 (0.00574) |
| moy             | 0.422                    | 0.0312             | 0.422                   | 0.0312             |
| N               | 12467                    | 11529              | 12467                   | 11529              |
| vce             | cluster                  | cluster            | cluster                 | cluster            |
| <b>urban</b>    |                          |                    |                         |                    |
| hh head sick    | 0.0124 (0.00859)         | 0.0167** (0.00699) | 0.0122 (0.00858)        | 0.0163** (0.00697) |
| moy             | 0.310                    | 0.109              | 0.310                   | 0.109              |
| N               | 14567                    | 14043              | 14567                   | 14043              |
| vce             | cluster                  | cluster            | cluster                 | cluster            |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table 3.A.7** – Fixed effects vs. first differences

|              | employed (0/1)        |                         |                        |
|--------------|-----------------------|-------------------------|------------------------|
|              | (1)<br>total          | (2)<br>rural            | (3)<br>urbain          |
| hh head sick | 0.0113**<br>(0.00463) | 0.00504<br>(0.00700)    | 0.0168***<br>(0.00619) |
| Observations | 33306                 | 14671                   | 18635                  |
| spouse sick  | -0.00577<br>(0.00575) | -0.0246***<br>(0.00910) | 0.00842<br>(0.00727)   |
| Observations | 27603                 | 12878                   | 14725                  |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3.A.8** – Fixed effects vs. first differences

|              | national              |                      | rural               |                     | urban                |                      |
|--------------|-----------------------|----------------------|---------------------|---------------------|----------------------|----------------------|
|              | (1)<br>FE             | (2)<br>FD            | (3)<br>FE           | (4)<br>FD           | (5)<br>FE            | (6)<br>FD            |
| <b>total</b> |                       |                      |                     |                     |                      |                      |
| hh head sick | 0.00815**<br>(0.004)  | 0.0109**<br>(0.005)  | 0.00348<br>(0.006)  | 0.00432<br>(0.007)  | 0.0134**<br>(0.006)  | 0.0166***<br>(0.006) |
| Observations | 54749                 | 33227                | 24018               | 14632               | 30731                | 18595                |
| <b>men</b>   |                       |                      |                     |                     |                      |                      |
| hh head sick | 0.00949<br>(-0.008)   | 0.0166*<br>(-0.010)  | 0.00758<br>(-0.013) | 0.0101<br>(-0.016)  | 0.0156<br>(-0.011)   | 0.0247**<br>(-0.013) |
| Observations | 19517                 | 11665                | 8612                | 5144                | 10905                | 6521                 |
| <b>women</b> |                       |                      |                     |                     |                      |                      |
| hh head sick | 0.00815**<br>(-0.004) | 0.00758*<br>(-0.004) | 0.00247<br>(-0.005) | 0.00211<br>(-0.006) | 0.0123**<br>(-0.006) | 0.0112*<br>(-0.006)  |
| Observations | 35232                 | 21562                | 15406               | 9488                | 19826                | 12074                |

controls omitted, clustered standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  FE: fixed effects; FD : first differences

**Table 3.A.9** – Test of strict exogeneity of head illness

|                 | employed (0/1)          |                        |                       |
|-----------------|-------------------------|------------------------|-----------------------|
|                 | (1)<br>total            | (2)<br>men             | (3)<br>women          |
| <b>national</b> |                         |                        |                       |
| F.hh head sick  | -0.00890<br>(0.00573)   | -0.0175<br>(0.0123)    | -0.00310<br>(0.00554) |
| N               | 33530                   | 11678                  | 21852                 |
| <b>rural</b>    |                         |                        |                       |
| F.hh head sick  | 0.00724<br>(0.00919)    | 0.0162<br>(0.0207)     | 0.00300<br>(0.00816)  |
| N               | 14773                   | 5170                   | 9603                  |
| <b>urban</b>    |                         |                        |                       |
| F.hh head sick  | -0.0208***<br>(0.00737) | -0.0422***<br>(0.0153) | -0.00697<br>(0.00748) |
| N               | 18757                   | 6508                   | 12249                 |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3.A.10** – Test of strict exogeneity of spouse illness

|                 | employed (0/1)       |                      |                       |                     |                        |
|-----------------|----------------------|----------------------|-----------------------|---------------------|------------------------|
|                 | (1)<br>total         | (2)<br>men           | (3)<br>women          | (4)<br>head         | (5)<br>children        |
| <b>national</b> |                      |                      |                       |                     |                        |
| F.spouse sick   | 0.00658<br>(0.00695) | 0.00734<br>(0.00910) | 0.00483<br>(0.00812)  | 0.0196*<br>(0.0109) | -0.000148<br>(0.00899) |
| N               | 27616                | 19702                | 7914                  | 10867               | 16749                  |
| <b>rural</b>    |                      |                      |                       |                     |                        |
| F.spouse sick   | -0.0108<br>(0.00918) | -0.0186<br>(0.0226)  | -0.00571<br>(0.00713) | 0.0196*<br>(0.0109) | -0.000148<br>(0.00899) |
| N               | 12938                | 4331                 | 8607                  | 10867               | 16749                  |
| <b>urban</b>    |                      |                      |                       |                     |                        |
| F.spouse sick   | 0.00475<br>(0.00781) | 0.0149<br>(0.0200)   | 0.00137<br>(0.00659)  | 0.0196*<br>(0.0109) | -0.000148<br>(0.00899) |
| N               | 14728                | 4724                 | 10004                 | 10867               | 16749                  |

controls omitted, clustered standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

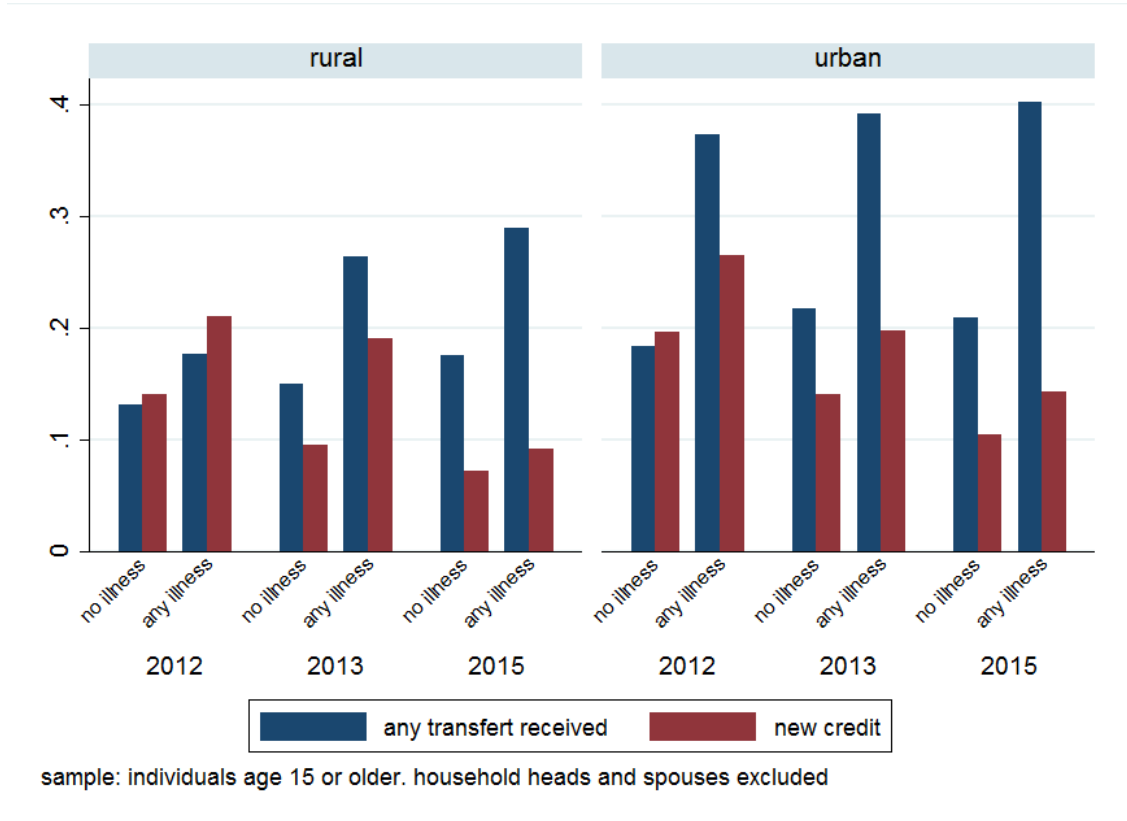
**Table 3.A.11** – Multiple comparison test based on interaction model

|   | contrast | std. err | unadjusted |        | Sidak's adjustment |         |
|---|----------|----------|------------|--------|--------------------|---------|
|   |          |          | t          | p >  t | critical value     | p-value |
| (head illness×rural×men) vs (no illness×rural×men)      | -0.026   | 0.007    | -3.56      | 0.000  | 2.491              | 0.000   |
| (head illness ×rural×women) vs (no illness×rural×women) | 0.007    | 0.007    | 0.96       | 0.335  | 2.491              | 0.804   |
| (head illness×urban×men) vs (no illness×urban×men)      | -0.004   | 0.007    | -0.63      | 0.532  | 2.491              | 0.952   |
| (head illness×urban×women) vs (no illness×urban×women)  | 0.015    | 0.006    | 2.52       | 0.012  | 2.491              | 0.047   |

critical value for Sidak's adjustment with  $\alpha = 0.05$  and number of tests  $m = 4$

### 3.B Additional figures

Figure 3.B.1 – Transfers and credits, by illness of household head



# Chapter 4

## The anatomy of poverty perceptions in Morocco : what is the role of local comparisons?<sup>1</sup>

### Contents

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|            |  |            |
|------------|--|------------|
| <b>4.1</b> | <b>Introduction</b>                                      | <b>172</b> |
| <b>4.2</b> | <b>Relevant literature</b>                               | <b>174</b> |
| <b>4.3</b> | <b>Data and methodology</b>                              | <b>177</b> |
| 4.3.1      | Data   | 177        |
| 4.3.2      | Methodology  | 177        |
| <b>4.4</b> | <b>Descriptive statistics</b>                            | <b>180</b> |
| <b>4.5</b> | <b>Results</b>   | <b>183</b> |
| 4.5.1      | Baseline results   | 183        |
| 4.5.2      | Comparison effects                                       | 186        |
| 4.5.3      | Channels: inequality, local public goods or social ties? | 189        |
| <b>4.6</b> | <b>Robustness : fixed effects ordered logit</b>          | <b>194</b> |
| <b>4.7</b> | <b>Conclusion and discussion</b>                         | <b>197</b> |
|            | <b>References</b>  | <b>199</b> |
|            | <b>Appendices</b>  | <b>205</b> |
| <b>4.A</b> | <b>Additional tables</b>                                 | <b>205</b> |
| <b>4.B</b> | <b>Additional figures</b>                                | <b>210</b> |

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<sup>1</sup>chapter based on a working paper co-written with Christophe Jalil Nordman

## 4.1 Introduction

One of the most consistent findings of “happiness economics” is that the relation between material standards of living and subjective well-being is, to a large extent, a *relative* phenomenon. It is not so much the absolute consumption or income level that matters for one’s happiness, but rather the amount relative to others. A large literature has shown that *relative income* has an equal or even stronger effect on subjective well-being than absolute income: Clark and Senik (2010); Di Tella, Haisken-De New, and MacCulloch (2010); Stutzer (2004). Income comparisons may be one explanation for the ‘paradox’ of stagnating happiness levels across countries, despite overall growth in income and consumption. (Clark et al., 2008; Easterlin, 1995). The policy implications of these findings are wide-ranging: they imply that an exclusive focus on economic growth is neither necessary, nor sufficient to improve overall welfare (Frank, 2001; Layard, 2005).

The issue of comparison effects has been less intensely studied in the context of developing countries, probably for lack of data on subjective well-being. Another reason might be that this research program has uneasy implications for anti-poverty policies. As noted by Ravallion and Lokshin (2010), if happiness really is relative, then economic growth is neither sufficient, nor even necessary to increase well-being at a societal level. If all incomes in society grow by the same amount, the relative positions will be left unchanged; and thus overall well-being may stay the same. Thus, it is somewhat of a relief that most authors studying subjective well-being in developing countries fail to find evidence of negative comparison effects (Bookwalter and Dalenberg, 2010; Knight and Gunatilaka, 2010; Lentz, 2017; Senik, 2004): in these papers, a higher income of one individual’s relevant “others” is not associated with a decrease in subjective well being. Some of these papers come up with, *positive* comparison effects: the better-off my neighbors are, the happier I feel.

In this paper, we study a closely related issue: the subjective perception by household of their standard of living<sup>2</sup>. It is now widely accepted that absolute, monetary poverty lines fail to capture the entirety of the experience of living in poverty (Stiglitz, Sen, Fitoussi, et al., 2009); yet the debate about the relative merits of “multidimensional” poverty lines versus a “dashboard” approach of development indicators is still ongoing (Alkire, Roche, Ballon, Foster, Santos, and Seth, 2015; Ravallion, 2011). The use of subjective measures of poverty and well-being may constitute a middle ground between these two approaches. They may be used to calibrate multidimensional poverty indices, thus sidestepping the inherent arbitrariness of “dual cutoffs” approaches following Alkire and Foster (2011), while retaining the advantage of allowing trade-offs between different

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<sup>2</sup>Some existing papers, e.g. Lentz (2017) or Ravallion and Lokshin (2010), use the terms “subjective well being” and “subjective poverty” interchangeably.

dimensions of development (Pattanaik and Xu, 2018; Ravallion, 2008; van Praag and Ferrer-i Carbonell, 2008).

This paper studies these issues in the context of current-day Morocco. The country has experienced a period of uninterrupted growth since the mid-nineties, and has known a drastic reduction of the proportion of its population living in extreme poverty (Chauffour, 2017). The country is reputed to enjoy a strong degree of political stability, emerging relatively unscathed from both the global financial crisis and the Arab spring (Vergne, 2014). Yet, political discontent is widespread, as witnessed in extremely low participation rates in national elections, and the country is experiencing local protest movements on a regular basis since 2011 (Arab Barometer, 2017).

One noteworthy aspect of these protests is that they generally do not originate in the most economically destitute places in the Kingdom. The anti-cronyism demonstrations of 2011 were mostly held in big, relatively well-off cities (Casablanca, Rabat, and Tangiers). More recently, several protest movements took place in the *Rif*, a region under-equipped in public infrastructure, but whose inhabitants enjoy above-average standards of living due to high remittances receipts. Conversely, sociologists have observed that the residents of destitute rural areas remain staunch “champions of the Alaouite throne” (Leveau, 1976).

The study of poverty perception is likely to shed lights on the underlying reasons for popular discontent in cities and stability in the countryside. In this chapter, we make use of a representative panel of households to study the determinants of subjective poverty over the 2012-2015 period. We focus particularly on comparison effects at various levels (village, neighborhood and county).

In line with a recent literature on local comparisons (Brodeur and Flèche, 2017; Deaton and Stone, 2013; Ifcher et al., 2018), we find that the direction of the ‘income comparison effect’ varies with the geographical reference scale: it is positive in neighborhoods or villages, but negative in more remote comparison areas (provinces). Moreover, income comparisons have a stronger effect on well-being in urban areas. We show that these results are distinct from an aversion to inequality. We also investigate two other channels through which these comparison effects might occur: the channel of public goods and the channel of social capital. We find no support for the channel of local public good effects, nor the degree of community engagement of household members, suggesting a role of direct, “other-regarding” preferences.

The remainder of this chapter is structured as follows. Section 4.2 reviews the relevant literature related to our study. Section 4.3 presents our data source and details our empirical methodology. Section 4.4 presents descriptive statistics, section 4.5 the results of our estimations. Part 4.6 is devoted to robustness tests, while the last part provides a

discussion and a conclusion.

## 4.2 Relevant literature

**Subjective well-being and comparison income** Happiness economics and the study of “Subjective Well Being” (SWB) has become an important field in the past ten years (e.g. Deaton, 2008; Di Tella and MacCulloch, 2006). One of the salient findings of this research program is that SWB appears to be *reference dependent*: declaring oneself to be happy is closely linked to the notion of comparison to a reference point. This reference point has a dual nature: it is both internal (i.e., myself in the past or in the future) and external (I compare myself to some group that I find relevant). The former dimension (comparison to oneself in the past and in the future) gives rise to the phenomenon of *adaptation* (both to higher income or to negative shocks) (Clark, Diener, Georgellis, and Lucas, 2008; Di Tella, Haisken-De New, and MacCulloch, 2010); the latter dimension (comparison to others) has been linked to the phenomenon of ‘comparison income’ (e.g. Clark and Senik, 2010; Ifcher et al., 2018; Senik, 2004): what matters for my own perceived well-being is not so much my income or consumption *per se*, but how much higher it is than that of relevant others.

The fact that SWB has an important relative dimensions has been advanced as a potential explanation for the so-called ‘Easterlin Paradox’ (Easterlin, 1995) of stagnating aggregate levels of happiness in industrialized countries (Clark et al., 2008): past some threshold, if the income of all individuals progress at the same rate, absolute income increases but relative income stay flat<sup>3</sup>.

Comparison effects, inasmuch as they suggest that utility is relative, raise important questions with regards to policy implications<sup>4</sup>. Most saliently in the case of developing countries, it would imply that an increase in the standards of living of the whole population would be neither necessary, nor sufficient, to guarantee higher levels of well-being of the population (Ravallion, 2014). More generally, one implication of this line of research is that one’s consumption imposes negative externalities on the rest of the population, via comparison mechanisms (Clark and D’Ambrosio, 2015); as a consequence, taxation of conspicuous consumption would be welfare improving (Frank, 2001).

The exploration of SWB in developing countries context is still new. Senik (2004) investigates comparison effects in post-transition Russia, Tao and Chiu (2009) do the same for Taiwan, as do Bookwalter and Dalenberg (2010) for South Africa, Ravallion and

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<sup>3</sup>However, new and better data has cast some doubt on the existence of the ‘paradox’, cf. Stevenson and Wolfers (2008).

<sup>4</sup>see e.g. Decancq et al. (2015) for a survey of the ethical issues linked to subjective-well being as a measure of welfare.

Lokshin (2010) for Malawi, Knight and Gunatilaka (2010) for China, Castilla (2012) for Mexico, and Lentz (2017) for Ghana. The relative scarcity of papers on SWB in developing countries context may reflect the lack of data on these issues. However, given the breadth of issues to which SWB data has been applied, it may be a fruitful area for further research: health (Deaton, 2008; Oshio and Kobayashi, 2010), contract farming (Dedehouanou et al., 2013), labor market issues (Falco et al., 2015), and poverty measurement (Dat, Thai, Pasquier-Doumer, and Thang, 2015; Ravallion, 2014; Razafindrakoto and Roubaud, 2005).

Regarding the issue of comparison income, the results of the existing studies on developing countries are more mixed than those in the context of industrialized nations. Some studies fail to find a significant negative effect of comparison income, except for a subset of urbanized, fairly well-off households (Bookwalter and Dalenberg, 2010; Castilla, 2012; Tao and Chiu, 2009). Other studies (e.g. Lentz, 2017; Ravallion and Lokshin, 2010; Senik, 2004) even find that, for the poorest households, the income of the relevant comparison group is associated with a higher level of SWB. This is consistent with the large literature on risk sharing in developing countries context, which typically shows that poor household rely on their social network to counteract the negatives consequences of shocks to their livelihood (Fafchamps and Gubert, 2007; Fafchamps and Lund, 2003). Note however that in the context of Senegal and with panel data, Dedehouanou et al. (2013) do find a negative effect of comparison income on SWB.

In earlier studies on relative deprivation, the “comparison income” (the income against which the individual was supposed to compare himself) was defined by the analyst in one of two ways : either as the mean income in the geographic vicinity of the individual, or as the income predicted from a Mincerian wage equation (e.g. Senik, 2004; Stutzer, 2004). Recent papers have tried to unpack the concept of reference group through detailed survey instruments (Bookwalter and Dalenberg, 2010; Ravallion and Lokshin, 2010). Most recently, Lentz (2017) used social network data on gift receipts and trust to construct a measure of “functions-based” reference groups. She finds that compared to spatially defined reference group, the comparison effect for the social network is positive. In the same vein, Ifcher, Zarghamee, and Graham (2018) shows that, in the US, the comparison effect changes sign when the comparison income is defined at the local level (ZIP-code) compared to a more aggregate geographical scale (the MSA area, a sub-county subdivision larger than the ZIP code). The authors interpret this as evidence that it is positive externalities of neighbors through local amenities that matter for perceptions of life satisfaction. Deaton and Stone (2013) find similar results.



**Multidimensional poverty measurement and analysis** Commonly used poverty lines based on consumption or income have been criticized on several grounds. They have trouble dealing with goods for which markets are non-existent or for which market prices do not reflect the value they provide to households: self-consumed goods, durable goods, public goods or publicly provided private goods (Deaton, 1997; Ravallion, 2008). These problems are particularly salient in poorer countries, where a larger part of household consumption come from self-production, and where missing markets and lack of competitions is arguably more prevalent than in a developed country context.

Faced with this issue, economists have expanded a lot of efforts into devising so-called “multidimensional” poverty indices (Bourguignon and Chakravarty, 2003; Tsui, 2002). In particular, the so-called “dual cutoff” approach, after Alkire and Foster (2011), has attracted the attention of international institutions such as the UNDP and has been implemented by numerous national statistical agencies (Alkire, Roche, Ballon, Foster, Santos, and Seth, 2015). The approach consists in defining a household as “multidimensionally poor” if they are below a certain number of thresholds in a minimum number of dimensions. This method has the advantage approach of allowing for some trade-off between the various “dimensions” of poverty, contrary to the polar cases of the “union” and “intersection” approaches required by dominance-based multidimensional poverty measures (Duclos, Sahn, and Younger, 2006). It allows for the possibility that a person may be deprived overall even when she is not deprived in all dimensions, as well as the possibility that a person may be non-deprived overall even when she is deprived in some dimensions (Pattanaik and Xu, 2018).

Yet the multidimensional poverty measures based on the dual cutoff approach have certain weaknesses, the most obvious one being that the choice of the dimensions and the cutoffs (both within the dimensions and in the number of dimensions in which to be deprived in order to be considered as poor) are all arbitrary<sup>5</sup>. They are defined by the analyst in a “top-down” fashion, and thus are vulnerable to the critic of being unscientific and reflecting mostly the analysts preferences (Ravallion, 2011). Moreover, the Alkire-Foster method has other theoretical weaknesses, such as the fact that in the aggregation step from the individual to the society-wide poverty measures, it does not put a higher weight on people that have more deprivations than others (Pattanaik and Xu, 2018). Finally, empirical analyses show that there is a lot of overlap in the information contained in the various “dimensions” of the MPI (the most common implementation of the Alkire-Foster methodology). As formulated by Pasha (2017), “there might not actually be so much multidimensionality within the dimensions of the MPI”.

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<sup>5</sup>This issue is also present for “monetary” poverty lines, but in the case of “multidimensional” indicators, the arbitrariness is compounded by the number of dimensions to be considered.

Subjective poverty may represent a possible middle ground between dashboard-based approaches of poverty measures and multidimensional poverty indices on the other hand. The idea is that directly asking individuals “do you feel poor?” can be used, not as a poverty line *per se* but as a basis to calibrate multidimensional poverty lines (Ravallion, 2014; van Praag and Ferrer-i Carbonell, 2008). Examples of this endeavor include Herrera, Razafindrakoto, and Roubaud (2006) and Dat et al. (2015).

## 4.3 Data and methodology

### 4.3.1 Data

We use data from the three first waves of the *Enquête panel de ménages* collected by the Moroccan National Observatory for Human Development (ONDH). We exploit the survey module on the perception of poverty (“subjective poverty”) as well as the module on civil participation and solidarity. The questions of these modules are asked to one respondent per household, typically the household head.

Our main dependent variable, *subjpov*, is the answer to the following question “Do you feel that you belong to : (1) the poorest households (2) somewhat poor households (3) middle-class households (4) somewhat well-off households (5) well-off or rich households”. In the empirical implementation, we invert the scale, in order to have higher values of the dependent variable represent higher self-perceived poverty.

The literature on economic psychology has distinguished between two different dimensions of subjective variables related to well-being and happiness: an *evaluative* dimension (“on a scale of 0 to 10, 0 being the worst possible life for you, and 10 being the best, how do you rank yourself?”) and an *hedonic* dimension (“did you experience a lot of happiness today”). Kahneman and Krueger (2006) and Deaton and Stone (2013) show that the former type of measures are more reliable, while hedonic measures tend to be more fickle and influenced by day-to-day variation in affects. In our case, the wording of the question is explicitly evaluative, and as such is a good prior on the reliability of this variable for empirical exploration; yet there are other issues, such as the frame-of-reference bias, which make a causal interpretation difficult. The next section discusses how our methodology tries to go around this problem.

### 4.3.2 Methodology

**Econometric model** We are interested in the determinants of the subjective poverty variable *subjpov*. This variable is ordinal, and there is little ambiguity in the way the categories are formulated : higher is always worse. But this variable cannot be interpreted

cardinally: nothing guarantees that the distance between two adjacent categories is constant. For instance, the distance in terms of subjective poverty between “very poor” and “rather poor” may or may not be the same as between “well-off” and “rich”. This is a problem, because commonly used linear models do impose cardinality on the dependent variable, something that may not be judicious here<sup>6</sup>. As a consequence we rely on models based on maximum likelihood, and specifically on random-effects ordinal logit.

The justification for the random effect ordered logit model is the assumption that poverty perception is a latent variable, denoted  $S^*$ , which depends on household characteristics collected in the vector  $X$ , a factor  $\delta_h$  representing unobserved household effect and an error term  $\epsilon_{ht}$ :

$$S_{ht}^* = \beta X_{ht} + \delta_h + \epsilon_{ht} \quad (4.1)$$

The latent variable is supplemented by an observational rule such that  $S = 1$  (*very poor*) whenever  $S^* \leq \mu_1$ ,  $S = 2$  (*somewhat poor*) when  $\mu_1 < S^* \leq \mu_2$ ,  $S = 3$  (*middle class*) when  $\mu_2 < S^* \leq \mu_3$ , and  $S = 3$  (*well-off or rich*) when  $S^* > \mu_3$ . The unobserved effect  $\delta_h$  is assumed to be uncorrelated with the variables in  $X$ , and normally distributed with mean zero and variance  $\sigma_\delta^2$ . The error term  $\epsilon_{ht}$  follows a logistic distribution with mean zero and unitary variance, leading to the ordered logit model. Under this model, the 3 threshold parameters  $\mu_i$  ( $i = 1, 2, 3$ ) are estimated jointly with the parameters  $\beta$ .

**Own income and relative income** We are interested in the presence of comparison effects: does the sentiment of being poor depend on the economic well-being of others? In order to test for the presence of comparison effects, we need an indicator of relative income or consumption, against which individuals are supposed to measure themselves. In this paper, we adopt a geographical definition of relative income. Our preferred measure, denoted  $Y^{rel}$ , is the (log) of the leave-out median income of households in the same geographical entity: the income of the household under consideration is being omitted:

$$Y_i^{rel} = \text{med}(G_{-i})$$

where  $G_{-i}$  is the geographically defined comparison group. We use the median as a preferred measure due to its robustness to extreme values; as a robustness check we also consider the case of the leave-out mean of the geographically defined comparison group:

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<sup>6</sup>In the context of subjective well-being, Ferrer-i Carbonell and Frijters (2004) show that the sign, significance and magnitude of the coefficient is not effected by the imposition of cardinality through the use of linear models. However, the measure they use in their study - a Cantrill ladder of life satisfaction with 11 response categories - is quite different from ours, so we do not follow this path.

$$Y_i^{rel} = \frac{1}{|G_{-i}|} \sum_{j \in G_{-i}} Y_j$$

As an additional robustness check, we also compute the same comparison measures with consumption instead of income (see part 4.6).

Finally, it might be the case that the comparison effect varies with the geographical scale of reference (Deaton and Stone, 2013). In particular, the comparison effect might be different between my local neighbors (at the level of the block or the neighborhood) and my more distant neighbors (at the level of the city) (Brodeur and Flèche, 2017; Ifcher et al., 2018).

To account for the possibility of different comparison mechanisms according to the geographical scale of reference, we compute  $Y^{rel}$  at two levels of aggregation: first at the level of the neighborhood or village, using the primary sampling unit; second, at the level of the province, a mid-level geographical entity. All monetary variables are deflated according to the official CPI, which takes into account price differences between urban and rural residents.

**Frame of reference bias** In our panel survey, subjective poverty is a household-level variable, but the question is asked to one person per household only. Thus there is a distinct risk that respondent characteristics influence the answer. In order to compare like with like, we control for characteristics of the respondent: age, sex, link to the household head, marital status, and activity status.

This will become a problem when attempting to control for time-unvarying unobservables in a panel setting due to the incidental parameters problem (Hensher et al., 2005). Yet estimates based on ordinal models with a random effect specification may be subject to “frame of reference bias” (Beegle, Himelein, and Ravallion, 2012; Bertrand and Mullainathan, 2001), the fact that subjective scales may be subject to unobserved heterogeneity coming from the fact that verbal expressions such as ‘rich’ and ‘poor’ may mean different things to different people, and that this heterogeneity in meaning is itself a function of the individual’s reference group. As a way to control this bias, we use the Mundlak parametrization of the unobserved effect, by adding the mean of our time-varying covariates to the specification (Hensher et al., 2005). As a robustness check, we implement the fixed-effects ordered logit models developed by Das and Van Soest (1999) and Mukherjee, Ahn, Liu, Rathouz, and Sánchez (2008)

**Control variables** We add controls for the individual characteristics of the respondent: age, age squared, education level, activity and marital status, as well as his position

in the household (his link to the household head). The household structure is controlled for by the number of children, youth, working-age and elderly living in the household, as well as the total number of women. We also include dummies for the region of residence, urban or rural residency, as well as survey-wave dummies. Throughout the paper, the standard errors are clustered at the level of the primary unit, to account for cluster-level correlation in our dependent variable.

## 4.4 Descriptive statistics

The distribution of perceived poverty is shown in table 4.1, disaggregated between urban and rural areas. We regroup the two highest modalities (“well-off” and “rich”) due to the small number of households who chose these answers. Overall, 48% of households define themselves as either “very poor” (15.46%) or “poor” (32.74%). This proportion is higher in rural areas, at 57% of the households, than in urban areas (42% of households). In total, 47.25% of households consider themselves to be middle class (39% in rural areas and 53% in urban areas), while 4.5% of households sampled perceiving themselves as being well-off or rich.

**Table 4.1** – Subjective poverty by residency (all years)

|              | rural  | urban  | Total  |
|--------------|--------|--------|--------|
| well-off     | 3.75   | 5.14   | 4.57   |
| middle class | 39.28  | 52.77  | 47.23  |
| rather poor  | 36.91  | 29.91  | 32.79  |
| very poor    | 20.06  | 12.18  | 15.42  |
| Total        | 100.00 | 100.00 | 100.00 |

Column percentages, frequencies in parentheses

As displayed in table 4.2, the distribution of subjective poverty is fairly stable over time. There is a small decrease of the proportion of households perceiving themselves as “very poor”(from 15.9% in 2012 to 14.5% in 2015), accompanied by a slightly bigger increase in the number of “rather poor” households (from 31.2% in 2012 to 34.9% in 2015). From an initial proportion of 6.2%, the proportion of “well-off” households decreases to 3.5% in 2015 (this is possibly a reflection of the common phenomenon of richer households dropping from the sample at a higher rate than the overall population).

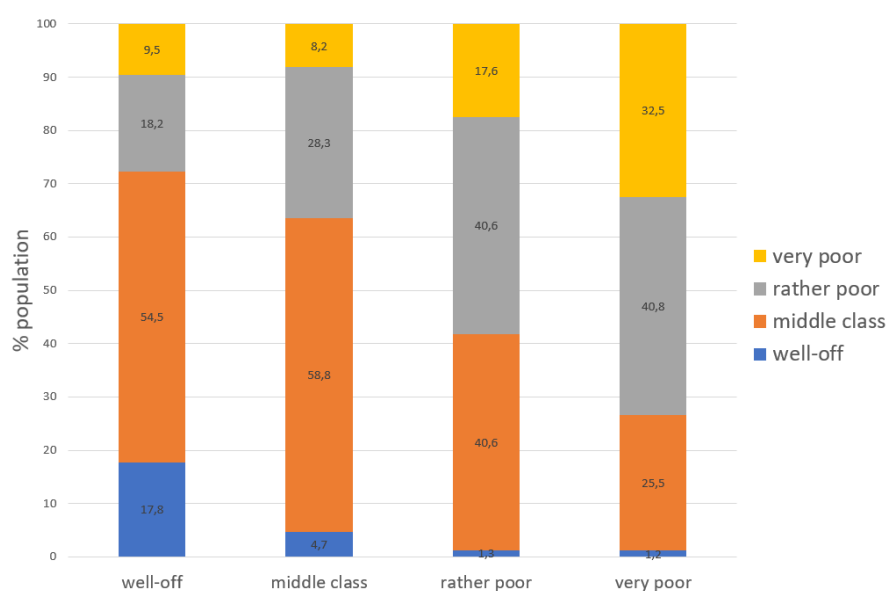
This stability of the distribution of perceived poverty at the aggregate level doesn’t give any information of the movements between different categories of perceived poverty at the household level. Tables 4.1 display the transition probabilities between different categories of subjective poverty, for consecutive panel waves (appendix tables 4.B.1 and 4.B.2 show the transition by year and by residency respectively). The level of mobility

**Table 4.2** – Subjective poverty by year (national)

|              | 2012   | 2013   | 2015   | Total  |
|--------------|--------|--------|--------|--------|
| well-off     | 6.14   | 3.88   | 3.48   | 4.57   |
| middle class | 46.80  | 47.85  | 47.04  | 47.23  |
| rather poor  | 31.12  | 32.46  | 35.10  | 32.79  |
| very poor    | 15.95  | 15.81  | 14.38  | 15.42  |
| Total        | 100.00 | 100.00 | 100.00 | 100.00 |

percentages, frequencies in parentheses

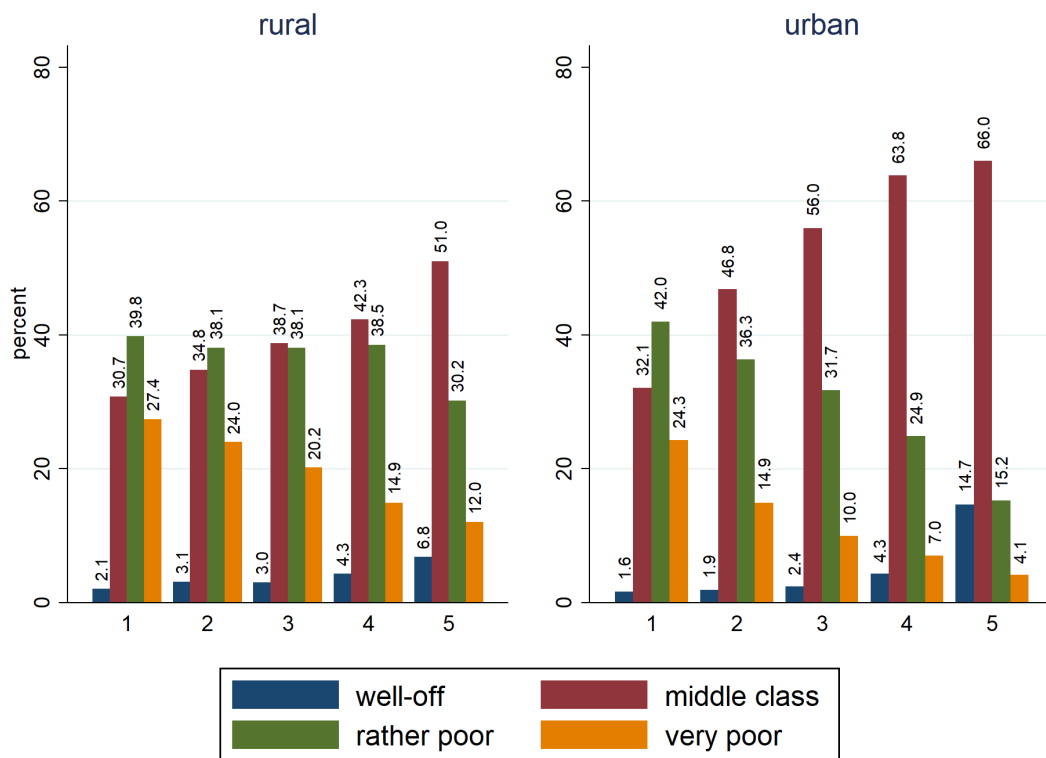
between adjacent categories is quite high, especially between adjacent categories. It is not infrequent that people change of more than one category between one wave and the next.

**Figure 4.1** – Transition probabilities between subjective poverty status (all years)

One possible interpretation of these large movements in the perceived poverty status is that the measure simply reflects a transient, ‘hedonic’ dimension of one’s evaluation, or day-to-day changes in one’s mood, and as such has little information on the stable, ‘evaluative’ component of one’s perception: the more the household answer to this question with “noise”, the more movement we will witness between categories in consecutive years. To verify this, we examine the other characteristics of the households’ living standards, as related to their perceived poverty status.

Figure 4.2 represents the distribution of subjective poverty by another indicator of living standards, quintiles of consumption per person (total household consumption divided by the number of persons living in the household). The proportion of households who consider themselves “very poor” or “poor” decreases monotonically with the con-

Figure 4.2 – Subjective poverty by consumption quintile



sumption quintile, while the proportion of households who see themselves as “middle class” or “well-off” increases with consumption (the link is clearer in urban areas, due to the fact that the spread in consumption is lower in rural areas, and thus the quintile are less far apart from each other). The link between consumption per capita and perceived poverty goes beyond the mean, as shown by figure 4.B.3 in the annex, which displays stochastic dominance of each category of subjective poverty over the preceding one, in terms of consumption per person.

Nor is the correlation of subjective poverty with standards of living restricted to consumption, as shown in table 4.3. Poorer households in terms have lower incomes, higher food shares, lower employment rates (despite having less inactive members in absolute numbers). The schooling ratio of children is lower, and the head has a higher chance of having no education or to have stopped at the primary level.

**Table 4.3** – Household characteristics, by subjective poverty

|                                  | well-off         |     | middle class     |     | rather poor      |     | very poor        | Total            | N      |
|----------------------------------|------------------|-----|------------------|-----|------------------|-----|------------------|------------------|--------|
| household size                   | 4,79<br>(2,58)   |     | 4,92<br>(2,29)   | *** | 4,86<br>(2,26)   |     | 4,46<br>(2,23)   | 4,82<br>(2,29)   | 21 802 |
| head education: none/primary     | 0,57<br>(0,50)   | *** | 0,67<br>(0,47)   | *** | 0,84<br>(0,37)   | *** | 0,90<br>(0,29)   | 0,76<br>(0,43)   | 21 754 |
| head education: lower secondary  | 0,08<br>(0,27)   |     | 0,11<br>(0,31)   | *** | 0,09<br>(0,28)   |     | 0,06<br>(0,23)   | 0,09<br>(0,29)   | 21 754 |
| head education: upper secondary  | 0,11<br>(0,31)   | *** | 0,11<br>(0,32)   | *** | 0,05<br>(0,22)   | *** | 0,03<br>(0,17)   | 0,08<br>(0,27)   | 21 754 |
| head education: higher education | 0,24<br>(0,43)   | *** | 0,11<br>(0,31)   | *** | 0,03<br>(0,16)   | *** | 0,01<br>(0,10)   | 0,07<br>(0,26)   | 21 754 |
| age of hh head                   | 56,79<br>(13,87) | *** | 53,80<br>(13,78) | *** | 52,56<br>(13,82) | *** | 52,70<br>(14,48) | 53,36<br>(13,94) | 21 754 |
| # of employed in hh              | 1,42<br>(1,06)   | *** | 1,32<br>(0,95)   | *** | 1,26<br>(0,90)   |     | 1,04<br>(0,83)   | 1,26<br>(0,93)   | 21 802 |
| # of elderly (>65yo)             | 0,47<br>(0,68)   | *** | 0,36<br>(0,62)   |     | 0,34<br>(0,60)   | *** | 0,35<br>(0,59)   | 0,35<br>(0,61)   | 21 802 |
| school enrolment rate            | 0,93<br>(0,22)   | *** | 0,93<br>(0,23)   | *** | 0,89<br>(0,27)   | *** | 0,86<br>(0,30)   | 0,90<br>(0,25)   | 10 832 |
| % employed                       | 0,46<br>(0,30)   | *** | 0,42<br>(0,27)   |     | 0,43<br>(0,27)   |     | 0,41<br>(0,30)   | 0,42<br>(0,28)   | 21 133 |
| # inactive                       | 1,77<br>(1,33)   |     | 1,91<br>(1,33)   | *** | 1,78<br>(1,27)   | *** | 1,60<br>(1,25)   | 1,82<br>(1,30)   | 21 802 |
| log total hh income              | 11,12<br>(1,11)  | *** | 10,63<br>(0,78)  | *** | 10,08<br>(0,72)  | *** | 9,60<br>(0,82)   | 10,31<br>(0,89)  | 21 702 |
| consumption p.pers. (ln)         | 10,19<br>(0,96)  | *** | 9,71<br>(0,69)   | *** | 9,36<br>(0,60)   | *** | 9,18<br>(0,60)   | 9,53<br>(0,71)   | 21 802 |
| food share                       | 34,30<br>(15,30) | *** | 38,77<br>(14,28) | *** | 43,01<br>(14,25) | *** | 45,10<br>(14,69) | 40,93<br>(14,67) | 21 802 |

mean coefficients; sd in parentheses; stars indicate result of t-test (z-test) of equality of means (proportions) against population mean. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4.5 Results

### 4.5.1 Baseline results

#### baseline: covariates of subjective poverty

Table 4.4 presents our baseline specification: it displays the coefficient of a random effect ordered logit of subjective poverty on respondent and household characteristics, separated by area of residency. In all specification, we control for time and region fixed effects (results omitted in the table). We display the coefficients both with the Mundlak parametrization of the unobserved effect (columns 2, 4 and 6) and without (columns 1, 3 and 5). The coefficient for the ordinal logit models are not directly interpretable, but thanks to the “single crossing” property of ordinal models, we can interpret the sign and the significance (Hensher et al., 2005).

For the most part, estimates conform with intuition and with the result of previous studies on SWB in developing countries (Knight and Gunatilaka, 2010; Senik, 2004). The U-shaped relationship between age and subjective poverty is not significant. Be-



ing married is negatively associated with subjective poverty. This might reflect reverse causality, as better-off people are more likely to get married due to the specifics of the marriage market in Morocco.

**Table 4.4** – perceived poverty : baseline results

|                                      | subjective poverty (1="well-off" ,4="very poor") |              |              |              |              |              |
|--------------------------------------|--|--------------|--------------|--------------|--------------|--------------|
|                                      | (1)<br>total                                     | (2)<br>total | (3)<br>rural | (4)<br>rural | (5)<br>urban | (6)<br>urban |
| woman                                | 0.261***   | 0.210***     | 0.301**      | 0.228*       | 0.238***     | 0.199**      |
| age                                  | 0.00110  | 0.00267      | 0.0124       | 0.0113       | -0.0112      | -0.00741     |
| age squared                          | -0.0000586                                       | -0.0000477   | -0.000141    | -0.000121    | 0.0000435    | 0.0000492    |
| marital status (b. single):          |  |              |              |              |              |              |
| - married                            | -0.296***  | -0.261***    | -0.323***    | -0.282**     | -0.277**     | -0.257**     |
| - widowed                            | -0.165   | -0.176       | -0.221       | -0.229       | -0.0861      | -0.122       |
| - divorced/other                     | 0.106  | 0.0655       | 0.0676       | 0.0403       | 0.186        | 0.118        |
| education level (b. lower secondary) |  |              |              |              |              |              |
| - none or primary                    | 0.549***   | 0.457***     | 0.522***     | 0.438***     | 0.551***     | 0.464***     |
| - upper secondary                    | -0.124*  | -0.0388      | -0.0999      | -0.0393      | -0.128       | -0.0302      |
| - higher education                   | -0.525***  | -0.278***    | -0.437**     | -0.236       | -0.523***    | -0.276***    |
| relation to hh head (b. head)        |  |              |              |              |              |              |
| -spouse                              | -0.0512  | 0.0263       | -0.105       | -0.0660      | -0.0312      | 0.0667       |
| -child (or child's spouse)           | -0.305***  | -0.267***    | -0.255**     | -0.208*      | -0.389***    | -0.364***    |
| -grandchild                          | -0.857**   | -0.653*      | -0.900**     | -0.770**     | -0.429       | -0.266       |
| -(step-)father/mother                | -0.379   | -0.268       | -0.898**     | -0.845**     | 0.00488      | 0.168        |
| -(step-) brother/sister              | -0.0494  | 0.0402       | -0.0691      | 0.000531     | -0.000820    | 0.0935       |
| -other parent                        | -0.0882  | 0.0677       | -0.523       | -0.408       | 0.671        | 0.777        |
| -other, not parent                   | -0.0845  | 0.0508       | -0.0664      | -0.0567      | -0.178       | 0.0107       |
| activity status (b. employed)        |  |              |              |              |              |              |
| - unemployed                         | 0.634***   | 0.601***     | 0.779***     | 0.762***     | 0.468***     | 0.445***     |
| - housewife                          | -0.211***  | -0.207***    | -0.111       | -0.0583      | -0.327***    | -0.346***    |
| - other inactive                     | -0.0968*   | -0.101*      | 0.136*       | 0.150*       | -0.301***    | -0.322***    |
| household structure                  |  |              |              |              |              |              |
| - # children (0-7)                   | 0.0583**   | 0.0661       | 0.0557*      | 0.0839       | 0.0966***    | 0.0465       |
| - # women                            | -0.0368*   | 0.0301       | -0.0299      | 0.0319       | -0.0444      | 0.0211       |
| - # youth (7-14)                     | 0.0592**   | 0.0963*      | 0.0527*      | 0.0185       | 0.0940***    | 0.208**      |
| - # working age (15-60)              | 0.0539***  | 0.00472      | -0.0170      | -0.0171      | 0.140***     | 0.0398       |
| # of elderly (>65yo)                 | -0.0573  | 0.0745       | -0.183***    | -0.136       | 0.0899       | 0.281**      |
| - # of generations in hh             | 0.0919**   | 0.149        | 0.0814       | 0.162        | 0.0718       | 0.149        |
| urban                                | 0.105*   | 0.263***     | .            | .            | .            | .            |
| log total hh income                  | -1.228***  | -0.771***    | -1.005***    | -0.689***    | -1.446***    | -0.856***    |
| cut1                                 | -16.34***  | -20.39***    | -13.34***    | -17.03***    | -19.37***    | -23.74***    |
| cut2                                 | -12.30***  | -16.26***    | -9.844***    | -13.50***    | -14.90***    | -19.14***    |
| cut3                                 | -10.11***  | -14.05***    | -7.733***    | -11.37***    | -12.61***    | -16.82***    |
| region                               | Yes  | Yes          | Yes          | Yes          | Yes          | Yes          |
| year                                 | Yes  | Yes          | Yes          | Yes          | Yes          | Yes          |
| Mundlak                              | No   | Yes          | No           | Yes          | No           | Yes          |
| N                                    | 20972  | 20972        | 8790         | 8790         | 12182        | 12182        |
| vce                                  | cluster  | cluster      | cluster      | cluster      | cluster      | cluster      |

ordered logit regression. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

A higher education of the respondent is associated with lower subjective poverty, but there is no difference between having an upper-secondary or lower-secondary education. Being the child or the parent of the household head has a negative association with subjective poverty, which might reflect life-cycle considerations present in other contexts (and might also explain why the age variables are not significant). Compared to being employed, unemployed status is negatively associated with subjective poverty,

even when controlling for living standards, a finding also present in developed economics (Winkelmann and Winkelmann, 1998). However, being inactive or being the housewife is associated with lower subjective poverty. This might reflect the fact that for a number of lower-educated women, working outside the home is associated with high disutility (cf. chapter 3). When disaggregating by residency, this negative association between housewife status and perceived poverty is significant in urban areas only.

The variables reflecting household composition have significant effects on subjective poverty, but most of the significance disappear with the Mundlak parametrization of unobserved effects (columns 2, 4 and 6), indicating that unobserved heterogeneity was driving the results. In urban areas, the number of elderly people and the number of youth in the household remain positively associated with subjective poverty, even after applying the Mundlak correction. One explanation for this may be that we are using imposing a wrong equivalence scale by using total household income as a measure of living standard (see section 4.6 on this last point). Predictably, income is consistently negative in significant.

One interesting aspect is that, when controlling for living standards, the dummy variable *urban* is significant with a negative sign in both specifications. All else being equal, a given household would “feel poorer” living in urban areas, compared to rural areas. This is unlikely to reflect differences in price levels, as all variables are adjusted for residency-specific consumer price index. One possibility for this is that in urban areas, one is more likely to be surrounded by richer people, and thus may experience negative comparison.

Before examining those comparison effects further, we report on detailed baseline results examining the link between health and work on the one hand and subjective poverty on the other hand. The results are displays in table 4.A.2 in the appendix to this chapter. Columns 1 to 3 present the results of our baseline specification restricted to employed individuals (as well as unemployed members who previously had a job), with job characteristics added as covariates: the nature of the occupation, the employment type (i.e., wage worker, self-employed and independent, and other), and the industry (primary, secondary, or tertiary).

Relative to being a wage worker, being self-employed is associated with lower subjective poverty, when controlling for earnings. This is consistent with the presence of intangible benefits associated with being autonomous, even in developing country context (on the same topic, cf. Falco et al., 2015, in the case of Ghana). The sector of occupation has no statistically significant association with subjective poverty. By contrast, the nature of the occupation has some importance: being a manager is negatively associated with perceived poverty, while farm work and unskilled workers (and, to a lesser extent, craftsperson) exhibit a positive coefficient, compared to the baseline category (i.e., pro-

fessionals).

Columns 4 to 6 present the results of an the baseline random effect order logit model of subjective poverty on the whole sample, but with added covariates reflecting the health of the respondent and of the household members. Chronic illness is associated with higher perception of poverty, even when controlling for household income. This is consistent with the need to use costly coping mechanisms in the case of illness, such as drawing down on savings or increased debt, which are not apparent in living standards indicators (cf. Flores et al., 2008, and chapter 3). Similarly, the coefficient of the number of other sick household members is positive and significant. Finally, the weight of the respondent, measured by categories based on body-mass index<sup>7</sup> is associated with subjective poverty: overweight or obese people feel less poor, and underweight people feel poorer.

To summarize the results of our baseline specification, the feeling of being poor is tightly linked with household income, which is not surprising. But it is also linked to several factors that do not enter classical measures of poverty, such as health, the nature of the work relation, and body mass index. The fact that these covariates affect subjective poverty in a predictable manner, consistent with previous literature on the subject, is another evidence that subjective poverty is a valid measure. The fact that urban residents feel poorer, even when controlling for household income, might be a reflection of comparison effects: as a resident of a city, one has presumably more exposure to people with different income levels than oneself, and as such more opportunities for comparison. We now turn to direct evidence for these comparison effects.

## 4.5.2 Comparison effects

### Relative income

Table 4.5 presents the results of the random effect ordered probit of subjective poverty regressions, with “relative income” added. We show results at the national level, as well as in rural and urban areas. Covariates are omitted from the presentation for the sake of brevity. All results control for year and region fixed effects, and parametrize the unobserved effects with the means of time-varying covariates. Standard errors are clustered at the level of the primary sample unit (village/neighborhood).

Our measure of comparison income is the median total household income in the geographical unit surrounding the household, the household’s own income being omitted. We use the sample design to compute such a comparison income at two different geo-

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<sup>7</sup>One is considered to be overweight if the BMI is superior to 25, and underweight if BMI is inferior to 18.5. BMI is defined as the weights in kg divided by the square of the height in meters.

**Table 4.5** – Relative income effects on perceived poverty, overall

|                                    | total                |                      | rural                |                      | urban                |                      |
|------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                    | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
| ln hh revenue p.pers               | -0.692***<br>(0.040) | -0.702***<br>(0.041) | -0.661***<br>(0.050) | -0.660***<br>(0.051) | -0.752***<br>(0.060) | -0.755***<br>(0.061) |
| cluster median income p.pers (ln)  | -0.323***<br>(0.067) | -0.407***<br>(0.080) | 0.005<br>(0.117)     | 0.016<br>(0.171)     | -0.559***<br>(0.077) | -0.596***<br>(0.088) |
| province median income p.pers (ln) |                      | 0.230**<br>(0.113)   |                      | -0.021<br>(0.199)    |                      | 0.157<br>(0.156)     |
| region                             | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| year                               | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Mundlak                            | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| N                                  | 20971                | 20966                | 8790                 | 8787                 | 12181                | 12179                |
| vce                                | cluster              | cluster              | cluster              | cluster              | cluster              | cluster              |

Standard errors in parentheses  
control variables omitted

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

graphical levels: first, at the sample cluster level, which typically constitutes a neighborhood (in urban areas) or a rural village; second, at the level of the *province*, a mid-level geographical entity<sup>8</sup>. We first show the results with relative income at the cluster level (columns 1, 3 and 5), then add the relative income at the province level (column 2, 4 and 6)

At the national level, the relative income of the area in which the household lives has different effects according to the geographical reference scale. Median cluster income is negatively associated with subjective poverty; province median income has a positive and significant coefficient. When segmenting by area of residency, the coefficients lose their significance in rural areas. In urban areas, the relative income at the neighborhood level remains significant, but not the relative income at the province level.

In order to check that our results do not rely on the particular centrality measure used, we run our regressions again with the mean of the reference group income as the measure of relative income. The results, presented in Appendix, table 4.A.1 are qualitatively similar to those described above.

### Relative consumption

Until now, we have used income as our preferred welfare measure, in line with the literature on SWB and comparison effects in developed countries. However, in general, income does not enter the utility function directly; it is the consumption of various goods over which individuals make their choices. Moreover, one could argue that consumption

<sup>8</sup>median province size is 371 000 inhabitants (76 700 households), divided between urban and rural areas.

is more readily observable by others than income, all the more so that consumption depends on permanent income rather than the transitory one that is typically observed in economic surveys (Attanasio and Pistaferri, 2016; Deaton, 1992). In developing countries context, consumption is generally preferred to income as a measure of household's standard of living, due to the well-known concerns about the irregular patterns of economic activity, informal labor contracts that make income less predictable, as well as partially monetized economy and payments in nature (Deaton, 1997).

We take an agnostic stance as to whether consumption or income is the best measure of the economic well-being, and re-estimate the model described by equation 4.1 by using consumption per person as a basis for the comparisons of the household to others. The results are displayed in table 4.6 below. In columns 1, 3 and 5, when using only the close neighbors (the survey cluster) as the comparison group, the coefficient is positive (although significant only at the national level and in rural areas). When adding in the same regression the median consumption at the provincial level (columns 2, 4 and 6), the effect of the local comparison group on subjective poverty is negative, and of the more remote comparison group is positive. The last finding is significant both in rural and in urban areas. Table 4.A.4 in appendix shows the results of similar models, but using the mean income of the various comparison groups instead of the median; the results are qualitatively similar.

**Table 4.6** – Reference consumption based on the median of the comparison group

|                               | total                |                      | rural                |                      | urban                |                      |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                               | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
| consumption p.pers. (ln)      | -1.033***<br>(0.048) | -1.076***<br>(0.048) | -0.986***<br>(0.076) | -1.025***<br>(0.076) | -1.113***<br>(0.062) | -1.138***<br>(0.062) |
| cluster median log cons/pers  | 0.197***<br>(0.075)  | -0.162**<br>(0.081)  | 0.666***<br>(0.139)  | 0.159<br>(0.172)     | -0.086<br>(0.086)    | -0.293***<br>(0.096) |
| province median log cons/pers |                      | 0.970***<br>(0.133)  |                      | 0.926***<br>(0.249)  |                      | 0.781***<br>(0.166)  |
| region                        | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| year                          | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Mundlak                       | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| N                             | 21059                | 21054                | 8817                 | 8814                 | 12242                | 12240                |
| vce                           | cluster              | cluster              | cluster              | cluster              | cluster              | cluster              |

Standard errors in parentheses  
control variables omitted

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

Overall, the results presented in this section are broadly consistent with recent papers by Brodeur and Flèche (2017) and Ifcher et al. (2018) showing, in a developed country context (USA), that the direction of income comparisons depends on the geographical

area: positive for close neighborhoods, negative at a more aggregate level. It is also consistent with results by Kingdon and Knight (2007) and Lentz (2017), showing that in developing countries context, subjective well being is sometimes positively correlated with the income of others, suggesting that “positive comparisons” may be at play. Yet, such “other-regarding preferences” are only one of several possible mechanisms through which the income of one’s comparison group affects one’s own subjective well-being. In the following section, we investigate several of such channels.

### Interaction models

How do we explain the fact that relative income is negatively related to perceived poverty when measured at the local level, and positively when measured at the more aggregate level? One way to investigate this apparent paradox is to interact both relative income variables. This is what we do in table 4.7, using either income and consumption as our basis for computing relative effects, and the mean or the median of the comparison groups. The income/consumption at the province level is still associated positively with subjective poverty, but there is a sign reversal at the level of the cluster: the coefficient is now positive. The interaction between cluster and province median (mean) income (consumption) is systematically negative and significant.

Thus, the effect of one’s neighbors average income depend on whether the neighborhood is locate in a rich or in a poor area. If I reside in a poor province, an increase in relative income at the neighborhood level is associated with an increase of my feeling of poverty. However, this “comparison effect” decreases with the level of the province. If I live in a rich province, an increase in my neighbors’ income is associated with lower feelings of poverty. This is consistent with the role of relative income as providing information about one’s own future prospects, documented by Senik (2004) in the case of transition Russia.

### 4.5.3 Channels: inequality, local public goods or social ties?

**Local public goods** The presence of relative income effects in subjective well-being regressions is often interpreted as evidence for other-regarding preferences (Clark et al., 2008; Frey and Stutzer, 2002) such as the relativity of utility. However, such effects might very well reflect other factors through which the living standards of others impose a negative externality on one’s own well-being, which might act as confounders. Two candidates for these kind of variables, as noted by Ifcher et al. (2018), are house prices and local public goods or amenities. Housing prices are expected to be positively correlated with average incomes in a particular location, and to affect negatively the subjective

**Table 4.7** – comparison effect: interaction models

|  | income                |                       | consumption           |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  | (1)<br>median         | (2)<br>mean           | (3)<br>median         | (4)<br>mean           |
| <b>subjective poverty (1=well-off, 4=very poor)</b>      |                       |                       |                       |                       |
| ln hh revenue p.pers                                     | -0.712***<br>(0.0398) | -0.707***<br>(0.0398) |                       |                       |
| consumption p.pers. (ln)                                 |                       |                       | -1.076***<br>(0.0480) | -1.074***<br>(0.0480) |
| cluster median income p.pers (ln)                        | 3.500***<br>(1.350)   |                       |                       |                       |
| cluster mean income p.pers (ln)                          |                       | 2.997**<br>(1.203)    |                       |                       |
| cluster median consumpti p. pers (ln)                    |                       |                       | 4.932***<br>(1.552)   |                       |
| cluster mean consumption p.pers (ln)                     |                       |                       |                       | 5.360***<br>(1.532)   |
| province median income p.pers (ln)                       | 3.911***<br>(1.259)   |                       |                       |                       |
| province mean income p.pers (ln)                         |                       | 3.479***<br>(1.121)   |                       |                       |
| province median log cons/pers                            |                       |                       | 5.810***<br>(1.496)   |                       |
| province mean consumption p.pers (ln)                    |                       |                       |                       | 6.192***<br>(1.457)   |
| cluster median income × province median income           | -0.435***<br>(0.148)  |                       |                       |                       |
| cluster mean income × province mean income               |                       | -0.384***<br>(0.132)  |                       |                       |
| cluster median consumption × province median consumption |                       |                       | -0.528***<br>(0.160)  |                       |
| cluster mean consumption × province mean consumption     |                       |                       |                       | -0.570***<br>(0.156)  |
| region   | Yes                   | Yes                   | Yes                   | Yes                   |
| year   | Yes                   | Yes                   | Yes                   | Yes                   |
| Mundlak  | Yes                   | Yes                   | Yes                   | Yes                   |
| N  | 20966                 | 20966                 | 21054                 | 21054                 |
| vce  | cluster               | cluster               | cluster               | cluster               |

Standard errors in parentheses

control variables omitted

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

well-being/poverty perception of its inhabitants. On the other hand, local amenities such as parks, school quality, number of healthcare professionals, etc. might be positively correlated to average incomes and subjective well-being.

**Table 4.8** – Channels: local public goods

|  | (1)<br>national        | (2)<br>rural            | (3)<br>urban            |
|--|------------------------|-------------------------|-------------------------|
| ln hh revenue p.pers                   | -1.115***<br>(0.0371)  | -0.967***<br>(0.0512)   | -1.268***<br>(0.0517)   |
| cluster mean income p.pers (ln)        | -0.623***<br>(0.0811)  | -0.0399<br>(0.174)      | -0.842***<br>(0.0915)   |
| province mean income p.pers (ln)       | 0.377***<br>(0.117)    | -0.0103<br>(0.209)      | 0.376**<br>(0.167)      |
| lower secondary schools (/1000 hab)    | -1.606<br>(2.181)      | 1.971<br>(3.857)        | -5.429*<br>(3.222)      |
| postal offices (/1000 hab)             | -0.758<br>(0.903)      | -1.738<br>(1.269)       | -0.106<br>(1.132)       |
| specialized health centers (/1000 hab) | 5.345<br>(11.89)       | 6.196<br>(17.20)        | 0.915<br>(15.01)        |
| beds in generalist hospitals           | 0.000614<br>(0.000486) | 0.00405***<br>(0.00118) | -0.000262<br>(0.000531) |
| beds in specialist hospitals           | 0.000407<br>(0.000563) | 0.000362<br>(0.000924)  | 0.000433<br>(0.000733)  |
| region                                 | Yes                    | Yes                     | Yes                     |
| year                                   | Yes                    | Yes                     | Yes                     |
| N                                      | 20628                  | 8502                    | 12126                   |
| vce                                    | cluster                | cluster                 | cluster                 |

Standard errors in parentheses

control variables omitted

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

In table 4.8, we test an extended specification of our subjective poverty regression in order to exclude the hypothesis that our results are driven by the presence of local public goods. More specifically, we use publicly available data<sup>9</sup> on the number and the location of schools (lower and upper secondary schools), health centers (rural dispensaries, generalist and specialist health centres), the number of hospital beds by type of hospital (generalist and specialist hospitals), and postal offices (as a proxy of general government services). We compute province- and milieu-specific (urban/rural) density measures for these indicators, in order to neutralize the effect of the number of inhabitants.

Few of these public goods variables have significant coefficients. The density of middle schools is associated with a lower level of subjective poverty in urban areas. In rural areas, the number of beds in generalist has a positive association with subjective poverty. This may reflect the lower-level public hospitals have a bad reputation, and that patients

<sup>9</sup>from the website data.gov.ma



may prefer, other things being equal, to seek care in specialist hospitals. The sign and significance of the mean income at province and cluster level is, in general, unchanged by the inclusion of local public goods density variables. Overall, this suggests that differential density of public goods between poor and rich provinces or areas is not the driving force behind our results, although one could think of other such local amenities that are not captured in our data (e.g. quality of roads, sanitation, public lighting, or safety in public places).

**Social capital** Another possible explanation for the positive coefficient found on mean income of small comparison areas (i.e., cluster level mean income) is that it may reflect possibilities for risk-sharing at the level of small communities (Cox and Fafchamps, 2007; Kingdon and Knight, 2007). One way to test indirectly for this hypothesis is to interact the neighbors' income with some measure of the intensity of social ties. The 'social insurance effect' should be stronger for individuals that have more intense social ties and/or a denser social network.

Table 4.9 presents a version of this exercise. In it, we interact the relative income (consumption) at the neighborhood level with a variable indicating the number of collective activities in which any member has participated in the last month<sup>10</sup>. In order to avoid endogeneity issue, we instrument the "collective activity" variable and its interaction with reference income by their first lags (column 3 and 4)<sup>11</sup>. In all cases, the interaction of our proxy of social capital with reference income at the cluster level is not significant. Thus, we find little support for the alternative explanation that "comparison effects" act mainly through the channel of risk-sharing opportunities.

**Inequality aversion** One last explanation for the effect of relative income/consumption on subjective poverty is that individuals have direct preferences over the level of inequality (Clark and D'Ambrosio, 2015). Indeed, under certain conditions, both inequality and relative deprivation are observationally equivalent, as the relative Gini coefficient can be seen as the mean of all the relative deprivations between an individual and the relevant comparison group (Cowell, 2011).

Table 4.10 show the result of our subjective poverty regression, adding a scale-invariant measure of inequality at the level of the neighborhood/village and the province. We add the standard deviation of income (column 1 and 2) and consumption (column 3 and 4) as

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<sup>10</sup>the precise wording of the question is the following: "In the past 12 months, have you participated in any of the following activities: (1) neighborhood management (*gestion du voisinage*), (2) family support (*entraide familiale*), (3) neighborhood support (*entraide des voisins*), (4) community or charity work (*travail associatif, bienfaisance*), (5) development projects (*Projets de développement*)"

<sup>11</sup>First stage is significant with F-tests values of 18.35 and 19.21 respectively

**Table 4.9** – Channel : social capital

|  | RE ordinal logit      |                       | RE-IV                 |                    |
|--|-----------------------|-----------------------|-----------------------|--------------------|
|  | (1)<br>income         | (2)<br>consumption    | (3)<br>income         | (4)<br>consumption |
| main   |                       |                       |                       |                    |
| ln hh revenue p.pers                           | -0.699***<br>(0.0410) |                       | -0.213***<br>(0.0551) |                    |
| consumption p.pers. (ln)                       |                       | -1.080***<br>(0.0476) |                       | -0.488*<br>(0.249) |
| cluster mean income p.pers (ln)                | -0.478***<br>(0.0816) |                       | 0.266<br>(0.424)      |                    |
| cluster mean consumption p.pers (ln)           |                       | -0.151*<br>(0.0872)   |                       | -1.739<br>(4.824)  |
| province mean income p.pers (ln)               | 0.237**<br>(0.114)    |                       | 0.0717<br>(0.198)     |                    |
| province mean consumption p.pers (ln)          |                       | 0.960***<br>(0.132)   |                       | -0.855<br>(2.964)  |
| # of members who participated in coll. activ   | -0.545<br>(0.431)     | 0.594<br>(0.408)      | 22.51<br>(26.00)      | -64.48<br>(177.9)  |
| collective activity × cluster mean revenue     | 0.0568<br>(0.0418)    |                       | -2.284<br>(2.657)     |                    |
| collective activity × cluster mean consumption |                       | -0.0591<br>(0.0427)   |                       | 6.971<br>(19.18)   |
| N  | 20966                 | 21054                 | 7944                  | 7968               |
| vce  | cluster               | cluster               | robust                | robust             |

Standard errors in parentheses

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

controls. Standard deviation of incomes at the cluster level has a negative association with subjective poverty; the same measure for consumption is not significant at the 5% level. In both cases, the negative coefficient of close reference group income/consumption persists, as does the positive coefficient of distant reference group income/consumption. Table 4.A.5 in appendix presents the same results by area of residency. As before, the results are more robust in urban areas. Finally, we experiment with another measure of local inequality, the inter-quartile range (IQR) of income and consumption at the local and distant reference group level (table 4.A.6 in the appendix). The IQR measures are not statistically significant, but the reference income/consumption effects persist.

Overall, the results presented in this section tend to dismiss the alternative explanations of the channels of local public goods and social interactions as explanations for the effect of comparison group income on poverty perceptions. They also show that these results cannot be explained by direct preferences over local inequalities. In a negative way, they tend to comfort the hypothesis that the effect of relative income is really driven by comparison effects. In the next section, we present additional robustness tests in favor of this hypothesis.

## 4.6 Robustness : fixed effects ordered logit

As its name suggests, subjective poverty depends on the individual-specific scales: everybody has a different idea of what it means to be rich or poor. As such, this is not a source of endogeneity; if it is not related systematically to the variables of interest, it would simply make the standard errors of the estimated coefficients bigger. But the problem for a causal interpretation of our results is that the frame of reference, which affects individuals estimate of subjective poverty, is also related to our variable of interest, namely reference group income. This possibility has been named the “frame-of-reference bias” (Beegle, Himelein, and Ravallion, 2012). It would appear if one individual makes use of local information (i.e., the comparison group incomes) to evaluate where he stands on the social ladder. Intuitively, if one poor person is only in contact with low-income persons, he would tend to think of himself as better-off; on the other hand, if a privileged individual is only in contact with richer members of the society, he would tend to see himself as more “middle-class” than he really is. In developed country context, there is extensive evidence for this bias in self-perceptions towards the middle of the income distribution (Cruces et al., 2013; Karadja et al., 2017).

One way to get around the frame-of-reference bias would be to get rid of all individual unobserved heterogeneity through fixed effects estimation. This, however, is incompatible with our modeling strategy of treating subjective poverty as an ordinal variable:

**Table 4.10** – Channels : local inequality

|  | income                |                       | consumption           |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  | (1)<br>median         | (2)<br>mean           | (3)<br>median         | (4)<br>mean           |
| ln hh revenue p.pers                                 | -0.721***<br>(0.0404) | -0.716***<br>(0.0403) |                       |                       |
| consumption p.pers. (ln)                             |                       |                       | -1.079***<br>(0.0478) | -1.073***<br>(0.0476) |
| cluster median income p.pers (ln)                    | -0.404***<br>(0.0768) |                       |                       |                       |
| cluster mean income p.pers (ln)                      |                       | -0.464***<br>(0.0782) |                       |                       |
| cluster median log cons/pers                         |                       |                       | -0.184**<br>(0.0827)  |                       |
| cluster mean consumption p.pers (ln)                 |                       |                       |                       | -0.238***<br>(0.0900) |
| province median income p.pers (ln)                   | 0.188*<br>(0.112)     |                       |                       |                       |
| province mean income p.pers (ln)                     |                       | 0.192*<br>(0.112)     |                       |                       |
| province median log cons/pers                        |                       |                       | 0.982***<br>(0.155)   |                       |
| province mean consumption p.pers (ln)                |                       |                       |                       | 1.038***<br>(0.158)   |
| cluster standard deviation of ln income p.pers       | -0.399**<br>(0.166)   | -0.418**<br>(0.171)   |                       |                       |
| cluster standard deviation of ln consumption p.pers  |                       |                       | 0.310<br>(0.218)      | 0.419*<br>(0.224)     |
| province standard deviation of ln income p.pers      | -0.215<br>(0.234)     | -0.233<br>(0.233)     |                       |                       |
| province standard deviation of ln consumption p.pers |                       |                       | -0.0644<br>(0.361)    | -0.294<br>(0.374)     |
| region   | Yes                   | Yes                   | Yes                   | Yes                   |
| year   | Yes                   | Yes                   | Yes                   | Yes                   |
| Mundlak  | Yes                   | Yes                   | Yes                   | Yes                   |
| N  | 20966                 | 20966                 | 21054                 | 21054                 |
| vce  | cluster               | cluster               | cluster               | cluster               |

Standard errors in parentheses

control variables omitted

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

estimation through maximum likelihood techniques of fixed-effects ordered models run against the incidental parameters problem of consistently estimating  $N$  fixed effects parameters  $\alpha_i$  with  $NT$  observations, where  $T$  is the number of time periods (in our case  $T = 3$ ) (Winkelmann and Boes, 2006).

One way to get around the incidentals parameters problem is to dichotomize the dependent variable, i.e., make it binary, and use a conditional logit model, integrating out the fixed effects terms  $\alpha_i$ . This procedure has the drawback of getting rid of a lot of information: all of the crossings between categories other than the chosen cutoffs are thrown away.

Two approaches have been proposed aiming at using conditional logit estimation while retaining all the information present in the various thresholds: the Minimum Distance approach of Das and Van Soest (1999), and the “Blow-up and Cluster” approach (Baetschmann et al., 2015). The first approach estimates conditional likelihood models at all possible points of dichotomization (in the case of a 4-points scale, there are three such points). All of the parameters estimates being consistent, it is possible to combine in a second step through minimum distance estimation. The resulting estimate is a weighted average of all conditional logit estimates. The second approach, first proposed by Mukherjee et al. (2008), consists in constructing a log-likelihood function based on the sum of the log-likelihood of the conditional logit estimators for all possible dichotomizations, and imposing the restriction of equality of parameters. In effect, it amounts to “blowing-up” the sample size by replacing each observation with  $K - 1$  copies of itself, where  $K$  is the number of categories of the ordinal variable; and in a second step, cluster the standard errors at the individual level (Baetschmann et al., 2015).

**Table 4.11** – Fixed effect ordered logit estimations

|                              | Minimum Distance      |                       | Blow up and cluster   |                       |
|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                              | (1)                   | (2)                   | (3)                   | (4)                   |
| main                         |                       |                       |                       |                       |
| ln hh revenue p.pers         | -0.722***<br>(0.0442) | -0.720***<br>(0.0445) | -0.731***<br>(0.0446) | -0.732***<br>(0.0449) |
| cluster median (log) income  | -0.0881<br>(0.0810)   | -0.0880<br>(0.109)    | -0.0879<br>(0.0815)   | -0.0903<br>(0.110)    |
| province median (log) income |                       | -0.00314<br>(0.142)   |                       | 0.00604<br>(0.142)    |
| Observations                 | 3962                  | 3959                  | 12605                 | 12600                 |

Standard errors in parentheses  
controls omitted

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

We display the results of the estimation in table 4.11 for both approaches. Columns

1 and 2 represent the result of the Minimum Distance approach of Das and Van Soest (1999); column 3 and 4 the “blow up and cluster” method of (Baetschmann et al., 2015). The coefficient of own household revenue is still negative and significant; however, the coefficients on reference group incomes are not significant. Two facts may explain this result: first, the estimation of conditional logit models rests on a smaller number of observation, since the conditional log-likelihood rests only on the observation for which there is a change in the outcome variable across the waves<sup>12</sup>. Second, as noted by Clark and D’Ambrosio (2015), measures of relative deprivation typically move little over time; hence, in a fixed-effect model, the coefficient will be very noisily estimated (in the limiting case were local-area characteristics are fixed, it will not be identifiable). This essentially means that fixed effect estimation may not be a relevant strategy to discover comparison effects.

## 4.7 Conclusion and discussion

Concerns about status and relative positions are not new in economics, dating as far back as Duesenberry and Veblen (Luttmer, 2005). Yet it is only relatively recently that data on happiness and subjective well-being has been exploited to explore the empirical relevance of such mechanisms. First-generation studies have put the accent on the phenomenon of ‘relative income’ as an explanation for the Easterlin paradox, with far-reaching policy implications regarding the desirability of economic growth and material progress. More recent studies have refined these finding, adding some nuances to the domain of their application, but without overturning completely the key insight that relative concern matter greatly for experienced utility.

From the perspective of development economics, the conclusions of this research program are somewhat problematic. First, it clashes with the received wisdom that “growth is good for the poor” (Dollar and Kraay, 2002). If wellbeing depends mostly on relative concerns, growth, even of the inclusive sort, may not be enough to improve the lot of the population past some thresholds. Second, a view according to which neighbors as systematically perceived as “negatives” is in contradiction with the literature on risk-sharing and social networks, which shows that individuals and households derive utility from the accomplishment of others (Cox and Fafchamps, 2007).

In this paper, we investigate whether comparison effects matter for the households perception of their economic status, using a panel data from Morocco. The Moroccan

<sup>12</sup>Column 3 and 4 display a greater number of observations, but this is due to the fact that the “blow up and cluster” method multiplied the number of observations by the number of cutoff points; it thus artificially inflates the sample.

context is interesting for the examination of comparison effects, as it is a lower middle-income countries with important inequalities in standards of living between urban and rural, as well as between regions. It is also an interesting context because of the political dynamics of local protest movements, which are not necessarily linked to material grievances and poverty but rather to inequality and dignity concerns (Rachik, 2014).

We find that relative income matters, but depends on the geographical reference scale. Median income in the neighborhood or village is associated with a better appreciation of one's own economic situation; while a higher income at the provincial level is associated with an increased perception of poverty. Similar to the findings of Ifcher et al. (2018) in the US, it seems to be the case that local neighbors are perceived as positive, and provincial neighbors are perceived as negatives. The effects (positive and negative) are more marked for rural residents than for urban households. We show suggestive evidence that these results are not driven by local public goods, nor by social assistance and risk sharing, which strengthens the case that these results are driven by other-regarding preferences (social comparison and altruism). These other-regarding preferences appear to be distinct from a simple distaste for inequality. Another possibility is that the link between reference income and feeling of poverty is confounded due to the frame-of-reference bias. We provide tentative evidence that this is not the case, through the estimation of fixed effects ordered logit specification; in any case, Beegle et al. (2012) have shown by using vignettes, albeit in another context, that this source of bias is not likely to be important in practice.

These results leave a lot of questions open. First of all, the reversal of the sign of the reference income between local neighbors and more distant neighbors, while interesting, remains a bit of a puzzle. If this is true, where is the line drawn? To say it differently, where is the geographical line where the neighbors stop being perceived as "positives" and start impacting negatively our well-being? The data that we have at our disposition does not allow to answer this question, but the interaction models of section 4.5.2 suggest that what matters for one's perception of poverty is the interaction between close and distant neighborhood. This is consistent with exposition effects and the information role of other's income: if I see others moving forward, I am all the more frustrated to be left behind.

This chapter suffers from several limitations, the principal of which is in our view the limited information that we have on the channels through which the relative income effect operates. A more precise characterization of local public goods could prove fruitful, as would an external source of data on spatial inequality. The mediating role of beliefs and cultures is also likely to be a venue for further research, especially in a country such as Morocco where a strong national culture coexists with ethnic and linguistic diversity.

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# Appendices

## 4.A Additional tables

**Table 4.A.1** – Reference income based on the mean of the comparison groups

|                                  | total                |                      | rural                |                      | urban                |                      |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                  | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
| ln hh revenue p.pers             | -0.686***<br>(0.041) | -0.697***<br>(0.041) | -0.650***<br>(0.051) | -0.643***<br>(0.051) | -0.750***<br>(0.060) | -0.757***<br>(0.061) |
| cluster mean income p.pers (ln)  | -0.368***<br>(0.064) | -0.464***<br>(0.081) | -0.063<br>(0.111)    | 0.038<br>(0.174)     | -0.588***<br>(0.077) | -0.662***<br>(0.091) |
| province mean income p.pers (ln) |                      | 0.245**<br>(0.114)   |                      | -0.173<br>(0.204)    |                      | 0.289*<br>(0.148)    |
| region                           | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| year                             | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Mundlak                          | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| N                                | 20971                | 20966                | 8790                 | 8787                 | 12181                | 12179                |
| vce                              | cluster              | cluster              | cluster              | cluster              | cluster              | cluster              |

Standard errors in parentheses

control variables omitted

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

**Table 4.A.2 – Determinants of subjective poverty: work and health**

|                                      | working conditions |              |              | health       |              |              |
|--------------------------------------|--------------------|--------------|--------------|--------------|--------------|--------------|
|                                      | (1)<br>total       | (2)<br>rural | (3)<br>urban | (4)<br>total | (5)<br>rural | (6)<br>urban |
| woman                                | 0.276**            | 0.407        | 0.156        | 0.273***     | 0.336***     | 0.227**      |
| age                                  | 0.0322**           | 0.0305*      | 0.0269       | 0.00139      | 0.0115       | -0.00895     |
| age squared                          | -0.000355**        | -0.000305*   | -0.000340    | -0.0000371   | -0.000117    | 0.0000507    |
| marital status (b. single):          |                    |              |              |              |              |              |
| - married                            | -0.519***          | -0.471***    | -0.492***    | -0.383***    | -0.399***    | -0.368***    |
| - widowed                            | -0.148             | -0.0138      | -0.180       | -0.182       | -0.222       | -0.139       |
| - divorced/other                     | 0.176              | 0.0732       | 0.323        | 0.106        | 0.0893       | 0.146        |
| education level (b. lower secondary) |                    |              |              |              |              |              |
| - none or primary                    | 0.564***           | 0.397***     | 0.683***     | 0.457***     | 0.432***     | 0.471***     |
| - upper secondary                    | 0.0751             | -0.170       | 0.206*       | -0.0487      | -0.0637      | -0.0344      |
| - higher education                   | -0.144             | -0.119       | -0.0718      | -0.297***    | -0.295       | -0.287***    |
| relation to hh head (b. head)        |                    |              |              |              |              |              |
| - spouse                             | 0.259              | 0.0641       | 0.421*       | -0.0200      | -0.125       | 0.0354       |
| - child (or child's spouse)          | -0.263**           | -0.329**     | -0.207       | -0.356***    | -0.289**     | -0.445***    |
| - grandchild                         | 0.00727            | -0.687       | 1.388        | -0.409       | -0.546       | -0.119       |
| -(step-)father/mother                | 1.693              | -2.478       | 25.39***     | -0.317       | -0.950**     | 0.138        |
| -(step-) brother/sister              | -0.678*            | -0.569       | -0.726       | -0.0795      | -0.0554      | -0.0630      |
| - other parent                       | 0.886              | -2.014***    | 2.841***     | 0.0675       | -0.371       | 0.637        |
| - other, not parent                  | 0.176              |              | -0.0301      | -0.0310      | -0.00623     | -0.108       |
| activity status (b. employed)        |                    |              |              |              |              |              |
| - unemployed                         | 0.800***           | 0.895***     | 0.703***     | 0.561***     | 0.740***     | 0.407***     |
| household structure                  |                    |              |              |              |              |              |
| - # children (0-7)                   | -0.0567            | -0.0743      | -0.0751      | -0.0393      | 0.00253      | -0.100       |
| - # women                            | 0.163*             | 0.226**      | 0.0731       | 0.0219       | 0.0294       | 0.00958      |
| - # youth (7-14)                     | -0.124             | -0.187*      | -0.0280      | -0.0124      | -0.0674      | 0.0620       |
| - # working age (15-60)              | -0.244***          | -0.292***    | -0.162       | -0.125***    | -0.119*      | -0.129**     |
| - # elderly (>65 yo)                 | -0.160             | -0.477***    | 0.345        | -0.0766      | -0.255*      | 0.0964       |
| - # of generations in hh             | -0.000794          | 0.175        | -0.253       | 0.0829       | 0.0804       | 0.102        |
| urban                                | 0.259***           | .            | .            | 0.255***     | .            | .            |
| ln hh revenue p.pers                 | -0.667***          | -0.629***    | -0.746***    | -0.724***    | -0.654***    | -0.785***    |
| employment type (b. wage worker)     |                    |              |              |              |              |              |
| - indep./employer                    | -0.290***          | -0.303***    | -0.357***    |              |              |              |
| - other                              | 0.0764             | -0.201       | 0.313        |              |              |              |
| industry (b. primary)                |                    |              |              |              |              |              |
| - secondary                          | -0.0807            | 0.0352       | -0.161       |              |              |              |
| - tertiary                           | 0.0193             | -0.0876      | 0.0268       |              |              |              |
| occupation (b. professionals)        |                    |              |              |              |              |              |
| - managers                           | -0.326***          | -0.655***    | -0.189       |              |              |              |
| - shopkeepers                        | 0.0882             | 0.241        | 0.0449       |              |              |              |
| - farmers                            | 0.0519             | 0.0757       | 0.110        |              |              |              |
| - craftpersons and indus. workers    | 0.198**            | 0.331**      | 0.148        |              |              |              |
| - farm workers & unskilled worker    | 0.444***           | 0.450***     | 0.496***     |              |              |              |
| - housewife                          |                    |              |              | -0.213***    | -0.0486      | -0.363***    |
| - other inactive                     |                    |              |              | -0.110**     | 0.184**      | -0.350***    |
| health                               |                    |              |              |              |              |              |
| chronic illness                      |                    |              |              | 0.119**      | -0.0851      | 0.259***     |
| acute/temporary illness              |                    |              |              | 0.115        | 0.0281       | 0.169*       |
| other illness                        |                    |              |              | 0.0448       | 0.201        | -0.249       |
| underweight                          |                    |              |              | 0.439***     | 0.230        | 0.707***     |
| overweight/obese                     |                    |              |              | -0.210***    | -0.292***    | -0.150***    |
| # of illness of others               |                    |              |              | 0.0642***    | 0.0598       | 0.0666**     |
| cut1                                 | -17.71***          | -14.24***    | -22.64***    | -20.15***    | -16.74***    | -23.58***    |
| cut2                                 | -13.69***          | -10.76***    | -18.00***    | -16.02***    | -13.20***    | -18.98***    |
| cut3                                 | -11.43***          | -8.612***    | -15.55***    | -13.81***    | -11.08***    | -16.66***    |
| sigma2_u                             | 0.308***           | 0.172**      | 0.517***     | 0.476***     | 0.360***     | 0.595***     |
| region                               | Yes                | Yes          | Yes          | Yes          | Yes          | Yes          |
| year                                 | Yes                | Yes          | Yes          | Yes          | Yes          | Yes          |
| Mundlak                              | Yes                | Yes          | Yes          | Yes          | Yes          | Yes          |
| N                                    | 10015              | 4803         | 5212         | 20964        | 8784         | 12180        |
| vce                                  | cluster            | cluster      | cluster      | cluster      | cluster      | cluster      |

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

Table 4.A.3 – Transition matrices by residency and time period

|   |       | NATIONAL |              |             |           |       | RURAL    |              |             |           |       | URBAN    |              |             |           |       |
|---|-------|----------|--------------|-------------|-----------|-------|----------|--------------|-------------|-----------|-------|----------|--------------|-------------|-----------|-------|
| <i>entire period</i><br>( <i>n=13 950</i> ) |       | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total |
| well-off                                    | 17,8  | 54,5     | 18,2         | 9,5         | 100       | 9,3   | 48,8     | 26,6         | 15,3        | 100       | 22,7  | 57,9     | 13,2         | 6,3         | 100       |       |
| middle class                                | 4,7   | 58,8     | 28,3         | 8,2         | 100       | 3,7   | 48,6     | 34,6         | 13,1        | 100       | 5,3   | 64,4     | 24,8         | 5,5         | 100       |       |
| rather poor                                 | 1,3   | 40,6     | 40,6         | 17,6        | 100       | 1,3   | 33,9     | 43,5         | 21,3        | 100       | 1,3   | 46,4     | 38,1         | 14,3        | 100       |       |
| very poor                                   | 1,2   | 25,5     | 40,8         | 32,5        | 100       | 1,3   | 25,0     | 40,4         | 33,3        | 100       | 1,1   | 26,0     | 41,5         | 31,4        | 100       |       |
| Total                                       | 3,68  | 47,44    | 33,73        | 15,14       | 100       | 2,6   | 38,5     | 38,6         | 20,3        | 100       | 4,5   | 53,9     | 30,2         | 11,4        | 100       |       |
| <b>2012-2013</b><br>( <b>n= 7 282</b> )     |       | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total |
| well-off                                    | 18,03 | 49,2     | 20,4         | 12,4        | 100       | 8,6   | 46,9     | 26,9         | 17,7        | 100       | 24,7  | 51,0     | 15,5         | 8,8         | 100       |       |
| middle class                                | 4,9   | 59,7     | 27,3         | 8,1         | 100       | 3,5   | 49,5     | 33,2         | 13,8        | 100       | 5,7   | 65,4     | 24,0         | 4,9         | 100       |       |
| rather poor                                 | 1,35  | 41,0     | 39,0         | 18,6        | 100       | 1,1   | 32,1     | 43,4         | 23,4        | 100       | 1,6   | 48,0     | 35,5         | 14,9        | 100       |       |
| very poor                                   | 0,68  | 26,3     | 39,1         | 34,0        | 100       | 0,7   | 23,6     | 38,4         | 37,3        | 100       | 0,7   | 28,9     | 39,8         | 30,6        | 100       |       |
| Total                                       | 3,87  | 47,8     | 32,5         | 15,8        | 100       | 2,4   | 38,4     | 37,3         | 21,9        | 100       | 4,9   | 54,4     | 29,1         | 11,6        | 100       |       |
| <b>2013-2015</b><br>( <b>n=6 588</b> )      |       | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total |
| well-off                                    | 17,67 | 63,5     | 14,5         | 4,4         | 100       | 11,4  | 52,9     | 27,1         | 8,57        | 100       | 20,1  | 67,6     | 9,5          | 2,8         | 100       |       |
| middle class                                | 4,5   | 57,9     | 29,4         | 8,2         | 100       | 4,0   | 47,7     | 36,1         | 12,24       | 100       | 4,8   | 63,3     | 25,9         | 6,1         | 100       |       |
| rather poor                                 | 1,21  | 39,9     | 42,5         | 16,4        | 100       | 1,4   | 35,4     | 44,1         | 19,11       | 100       | 1,0   | 44,3     | 41,2         | 13,6        | 100       |       |
| very poor                                   | 1,84  | 24,5     | 42,6         | 31,1        | 100       | 2,0   | 26,2     | 42,1         | 29,68       | 100       | 1,7   | 22,1     | 43,5         | 32,7        | 100       |       |
| Total                                       | 3,51  | 47,0     | 35,2         | 14,3        | 100       | 2,8   | 38,6     | 40,1         | 18,44       | 100       | 4,1   | 53,3     | 31,6         | 11,1        | 100       |       |
| <b>2012-2015</b><br>( <b>n= 6 659</b> )     |       | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total | well-off | middle class | rather poor | very poor | Total |
| well-off                                    | 10,3  | 53,3     | 26,5         | 10,0        | 100       | 5,2   | 51,5     | 33,5         | 9,8         | 100       | 14,1  | 54,6     | 21,2         | 10,1        | 100       |       |
| middle class                                | 4,6   | 57,6     | 29,4         | 8,3         | 100       | 3,9   | 45,9     | 36,3         | 13,9        | 100       | 5,0   | 64,6     | 25,4         | 5,0         | 100       |       |
| rather poor                                 | 1,7   | 41,5     | 40,5         | 16,4        | 100       | 1,9   | 36,9     | 42,0         | 19,3        | 100       | 1,5   | 45,3     | 39,3         | 13,9        | 100       |       |
| very poor                                   | 1,2   | 24,5     | 44,2         | 30,0        | 100       | 1,1   | 22,1     | 46,4         | 30,4        | 100       | 1,4   | 27,3     | 41,4         | 29,9        | 100       |       |
| Total                                       | 3,5   | 47,0     | 35,1         | 14,4        | 100       | 2,7   | 38,6     | 40,0         | 18,6        | 100       | 4,0   | 53,3     | 31,4         | 11,3        | 100       |       |



**Table 4.A.4 – Reference consumption based on the mean of the comparison group**

|                                       | total                |                      | rural                |                      | urban                |                      |
|---------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                       | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
| consumption p.pers. (ln)              | -1.034***<br>(0.048) | -1.072***<br>(0.048) | -1.001***<br>(0.076) | -1.037***<br>(0.076) | -1.107***<br>(0.061) | -1.128***<br>(0.061) |
| cluster mean consumption p.pers (ln)  | 0.199**<br>(0.077)   | -0.184**<br>(0.087)  | 0.735***<br>(0.144)  | 0.156<br>(0.190)     | -0.107<br>(0.091)    | -0.322***<br>(0.102) |
| province mean consumption p.pers (ln) |                      | 0.964***<br>(0.132)  |                      | 0.986***<br>(0.244)  |                      | 0.744***<br>(0.164)  |
| region                                | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| year                                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Mundlak                               | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| N                                     | 21059.000            | 21054.000            | 8817.000             | 8814.000             | 12242.000            | 12240.000            |
| vce                                   | cluster              | cluster              | cluster              | cluster              | cluster              | cluster              |

Standard errors in parentheses

control variables omitted

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

**Table 4.A.5 – Channels : inequality, by area**

|  | income                |                       | consumption           |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  | (1)                   | (2)                   | (3)                   | (4)                   |
|  | urban                 | rural                 | urban                 | rural                 |
| ln hh revenue p.pers                                 | -0.677***<br>(0.0509) | -0.770***<br>(0.0612) |                       |                       |
| consumption p.pers. (ln)                             |                       |                       | -1.026***<br>(0.0756) | -1.141***<br>(0.0617) |
| cluster median income p.pers (ln)                    | -0.00589<br>(0.164)   | -0.578***<br>(0.0865) |                       |                       |
| cluster median log cons/pers                         |                       |                       | 0.147<br>(0.179)      | -0.320***<br>(0.0969) |
| province median income p.pers (ln)                   | -0.0922<br>(0.193)    | 0.113<br>(0.160)      |                       |                       |
| province median log cons/pers                        |                       |                       | 0.956***<br>(0.288)   | 0.807***<br>(0.180)   |
| cluster standard deviation of ln income p.pers       | -0.310<br>(0.225)     | -0.433<br>(0.264)     |                       |                       |
| cluster standard deviation of ln consumption p.pers  |                       |                       | 0.148<br>(0.400)      | 0.356<br>(0.257)      |
| province standard deviation of ln income p.pers      | -0.371<br>(0.320)     | 0.0691<br>(0.305)     |                       |                       |
| province standard deviation of ln consumption p.pers |                       |                       | -0.208<br>(0.554)     | -0.136<br>(0.420)     |
| region   | Yes                   | Yes                   | Yes                   | Yes                   |
| year   | Yes                   | Yes                   | Yes                   | Yes                   |
| Mundlak  | Yes                   | Yes                   | Yes                   | Yes                   |
| N  | 8787                  | 12179                 | 8814                  | 12240                 |
| vce  | cluster               | cluster               | cluster               | cluster               |

Standard errors in parentheses

control variables omitted

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

**Table 4.A.6** – Inequality channel, IQR instead of SD

|  | income                |                       | consumption           |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  | (1)<br>median         | (2)<br>mean           | (3)<br>median         | (4)<br>mean           |
| ln hh revenue p.pers                             | -0.711***<br>(0.0407) | -0.706***<br>(0.0406) |                       |                       |
| consumption p.pers. (ln)                         |                       |                       | -1.078***<br>(0.0480) | -1.075***<br>(0.0479) |
| cluster median income p.pers (ln)                | -0.409***<br>(0.0789) |                       |                       |                       |
| cluster mean income p.pers (ln)                  |                       | -0.468***<br>(0.0801) |                       |                       |
| cluster median log cons/pers                     |                       |                       | -0.183**<br>(0.0812)  |                       |
| cluster mean consumption p.pers (ln)             |                       |                       |                       | -0.223**<br>(0.0875)  |
| province median income p.pers (ln)               | 0.232**<br>(0.114)    |                       |                       |                       |
| province mean income p.pers (ln)                 |                       | 0.252**<br>(0.117)    |                       |                       |
| province median log cons/pers                    |                       |                       | 1.042***<br>(0.145)   |                       |
| province mean consumption p.pers (ln)            |                       |                       |                       | 1.076***<br>(0.145)   |
| cluster interquartile range of ln income p.pers  | -0.0610<br>(0.106)    | -0.0521<br>(0.108)    |                       |                       |
| cluster IQR of ln consumption p.pers             |                       |                       | 0.148<br>(0.123)      | 0.190<br>(0.125)      |
| province interquartile range of ln income p.pers | -0.198<br>(0.154)     | -0.215<br>(0.154)     |                       |                       |
| province IQR of ln consumption p.pers            |                       |                       | -0.260<br>(0.185)     | -0.339*<br>(0.187)    |
| region   | Yes                   | Yes                   | Yes                   | Yes                   |
| year   | Yes                   | Yes                   | Yes                   | Yes                   |
| Mundlak  | Yes                   | Yes                   | Yes                   | Yes                   |
| N  | 20966                 | 20966                 | 21054                 | 21054                 |
| vce  | cluster               | cluster               | cluster               | cluster               |

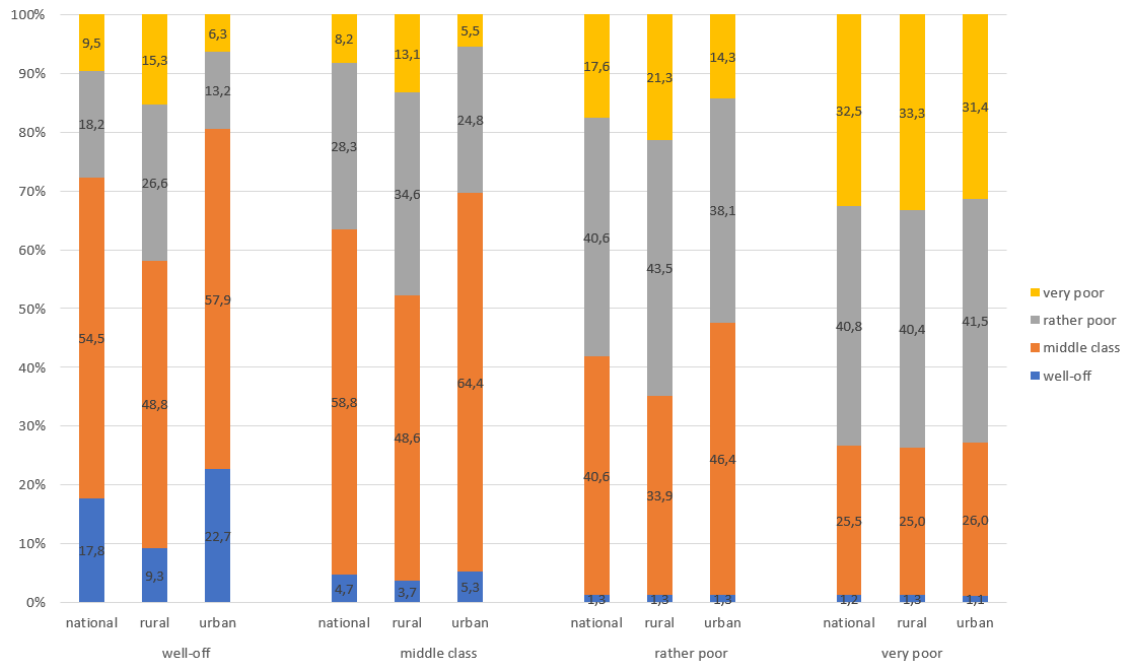
Standard errors in parentheses

control variables omitted

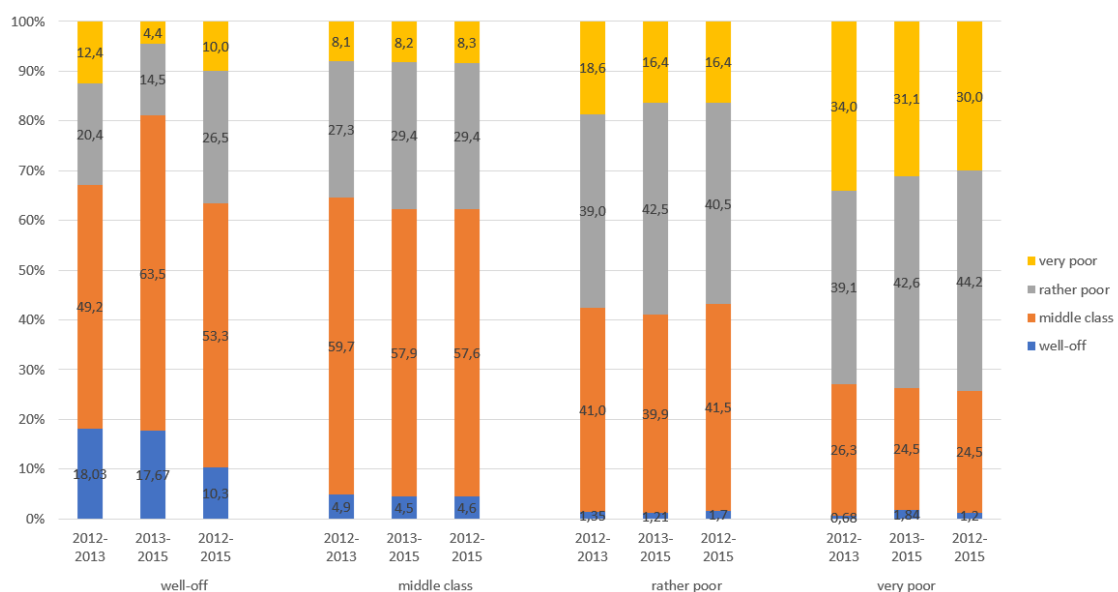
\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4.B Additional figures

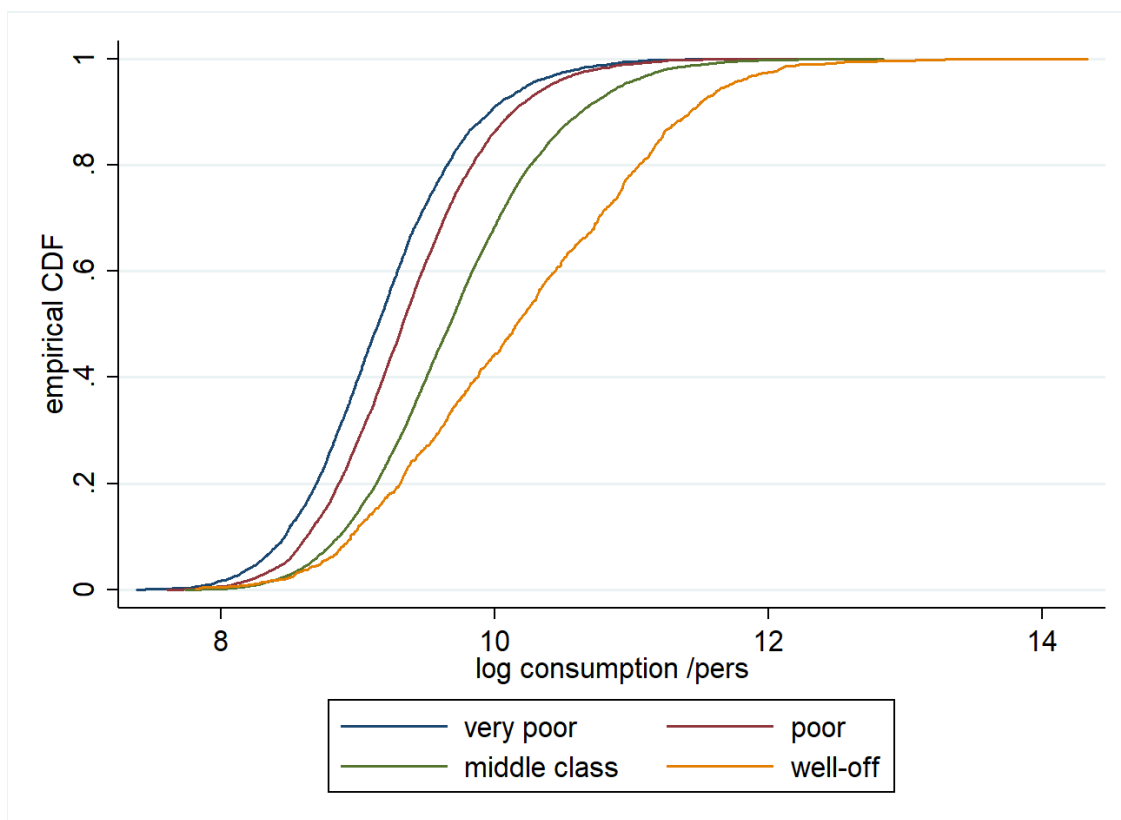
**Figure 4.B.1** – Transition probabilities between subjective poverty status, by residency (all years)



**Figure 4.B.2** – Transition probabilities between subjective poverty status, by year (national)



**Figure 4.B.3** – Empirical cumulative distribution of consumption per person, by subjective poverty





## RÉSUMÉ

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Cette thèse exploite une nouvelle source de données longitudinales sur les niveaux et les conditions de vie des ménages marocains en vue d'éclaircir les liens existants entre santé, protection sociale, et pauvreté, dans le cas du Maroc. Dans un premier temps, nous évaluons l'impact d'un programme national de gratuité des soins sur le recours aux soins et le poids financier des dépenses liées à la santé. En deuxième lieu, nous examinons comment les chocs de santé se répercutent sur la répartition de l'offre de santé au sein du ménage. Enfin, nous analysons les déterminants du sentiment de pauvreté au sein de la population marocaine, avec une attention particulière portée aux effets de comparaison. Les principaux résultats de ce travail sont que le programme de gratuité des soins a eu un impact positif de taille modérée sur l'accès aux soins en milieu rural, mais pas d'effet décelable en milieu urbain, ni sur les dépenses de santé. Nous montrons que les ménages marocains utilisent une gamme variée de mécanismes informels pour se protéger contre le risque financier lié à la santé ; en particulier, l'offre de travail féminine en milieu urbain réagit positivement à la maladie du chef de ménage. Enfin, nous trouvons que le sentiment de pauvreté est lié au niveau de vie moyen du groupe de référence du ménage, mais que cet effet varie en fonction de l'échelle géographique de ce groupe : le revenu moyen des voisins proches est lié négativement au sentiment de propre pauvreté, tandis que celui de la province de résidence est lié positivement à la pauvreté subjective.

## MOTS CLÉS

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Accès aux soins ; Filets de protection sociale ; Santé et offre de travail ; Protection informelle ; Pauvreté subjective

## ABSTRACT

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This dissertation exploits a new nationally representative panel survey of household conditions in order to investigate different aspects of the health-social protection-poverty nexus in present-day Morocco. First, we assess the impact of a policy of 'free health care' on access to public hospitals and health-related expenditures. Second, we investigate how shocks related to ill health are related to various coping mechanisms, in particular to the reallocation of labor within the household. Third, we analyze the determinants of the feeling of being poor in the Moroccan population, with a focus on comparison effects. We find that the free health care policy had a moderate, but positive, impact on access to health care among rural households, but a limited impact on health expenditures and no impact on consultation rates for urban household. Moroccan families use a variety of coping mechanisms to cover themselves against the financial shocks linked to illness; in particular, we show that in urban areas, female labor supply reacts positively to illness of the household head, which suggests that low female labor force participation is driven by supply-side reasons. Finally, we find that the feelings of being poor is influenced by the income of various comparison groups, albeit in different directions according to the geographical scale: the income of the comparison group at the neighborhood or village level is negatively associated with the feeling of poverty, while the income at the province level is positively correlated with one's own poverty perception.

## KEYWORDS

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Access to health care; Social safety nets; Health and labor supply; Informal protection; Subjective poverty

