Tunisia Poverty Assessment

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ABBREVIATIONS

ADB	African Development Bank
B40	Bottom 40 percent
CGE	Computable general equilibrium
CPF	Country Partnership Framework
CPI	Consumer Price Index
DHS	Demographic and Health Survey
ENBCV	National Survey on Households' Budget and Consumption (*Enquête Nationale sur le Buget, la Consommation et le niveau de Vie des ménages*)
ENPE	Labor Force Survey (*Enquête Nationale sur la Population et l'Emploi*)
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GIC	Growth incidence curves
Ha	Hectare
HAZ	Height-for-age z-score (HAZ score)
HOI	Human Opportunity Index
I/O	Input/output
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
INS	Institut National des Statistiques
kWh	kilo watts per hour
LPG	Liquefied petroleum gas
MDG	Millennium Development Goal
MENA	Middle East and North Africa
MICS	Multiple Cluster Indicator Surveys
NP	Nonpoor
OLS	Ordinary least square
P	Poor
PNAFN	National Program to Aid the Most Needy (*Programme National d'Aide aux Familles Nécessiteuses*)
Pp	Percentage point
PPP	Purchasing power parity
SCD	Systematic Country Diagnostics
SD	Standard deviation
TD	Tunisian dinar
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme

Executive Summary: Key Messages

Tunisia emerges today the only success story of the Arab Spring revolution that swept the Arab world five years ago. Yet, substantive economic, political, social and security challenges remain, preventing demands by Tunisians on inclusive growth, good governance and sustainable development from truly materializing. This report is intended to help fulfil those demands by providing the Government of Tunisia and civil stakeholders new and useful evidence on the links between poverty, inequality, vulnerabilities, opportunities and specific policy alternatives.

The starting point is the Jasmine revolution in Tunisia that took the world by surprise. The revolution took place in a country that for 10 years had grown at an annual rate of 4.5 percent; had managed to halve its poverty incidence from 35 percent to 16 percent in a decade; and had delivered impressive achievements in social development, from universal access to electricity and primary education enrollment to substantive reductions in child malnutrition and maternal and infant mortalities. Poverty reduction, in particular, was recognized as exemplary by local and international observers alike. Despite these achievements, a revolution has taken place and multiple challenges still curb citizens' aspirations.

Far from trying to explain why there was a revolution in Tunisia (already treated in depth elsewhere else, see for example World Bank 2014a), this Poverty Assessment seeks to learn from the pre and post revolution periods with a view of avoiding the repetition of past mistakes in the future. Specifically, it will provide Tunisians with a more detailed and updated diagnostics of poverty, regional disparities, trends over time and the strong links between poverty, inequality, opportunities and vulnerability. Beyond statistics, this report would also provide a somber but more balanced alternative explanation of socioeconomic development in the country, which will hopefully complement the efforts of the Government of Tunisia to develop and implement its strategic development plan. This Poverty Assessment questions the extent to which growth was truly pro-poor in Tunisia and, more importantly, capable of reducing inequalities and increasing inclusion in society. This questioning sheds light on Tunisia's prospects for a more prosperous society if substantive changes in the socioeconomic model are not introduced. To deepen that understanding, this assessment provides a fresher look at poverty and disparities in Tunisia by focusing on poverty and disparities over time, extending the current period of analysis beyond 2010, the latest year for official statistics on poverty. Furthermore, the Poverty Assessment analysis goes into a post-2010 analysis; expanding as well the analysis of monetary poverty to broader concepts of vulnerability and equal opportunities; and by enriching traditional instruments with more sophisticated tools to measure poverty, analyze poverty dynamics, and simulate the effects of certain policy reforms for the first time in Tunisia. Key findings from the analysis are structured around a few specific questions.

1. Growth in Tunisia has contributed to reduce poverty but not inequality

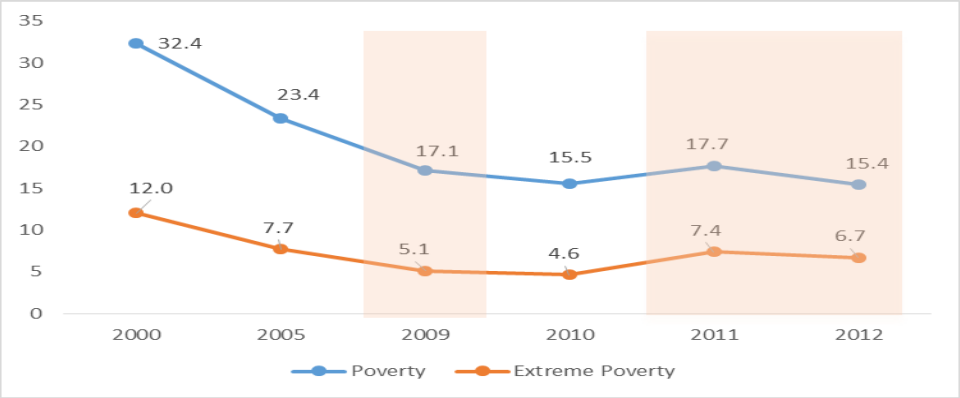
Certainly, the development of an export-oriented labor-intensive sector (inclusive of low-skilled females) such as textile and garments manufactures; the expansion of the tourism industry; control of inflation; increasing investments in rural agriculture; and generous food subsidies that facilitate and incentivize the increase in agricultural output all contributed to increasing living standards of Tunisians while also increasing economic growth. Other interventions were implemented, reportedly also with a view on reducing poverty: increases in minimum wages; strong investments in human capital (including education) and birth control programs; rural development programs that expanded infrastructure, roads, water supply and sanitation; generous—although poorly targeted—energy subsidies; and microcredit programs. Since the mid-1980s, a plethora of social assistance programs, funds for employment creation, training programs, and social investment funds have all been launched to benefit the poor.

However, several fundamental features of the Tunisian economic model have simultaneously failed to bring about more economic productivity and social inclusion. Investment policy has long been founded on a separate treatment of companies producing for export (offshore) vis-à-vis domestic (onshore) markets. The result is greater imports of (tax-free and higher-quality) intermediate products; fewer domestic jobs; low demand for high-skill workers; and low salaries. Incentives to attract investments and favor job creation are highly concentrated in sectors that are not labor intensive and in coastal regions, thus exacerbating regional disparities. Vital sectors of the economy have been hindered by excessive regulatory policies, which has created opportunities for rent extraction. The sustainability of the entire financial system is at risk due to lack of competition and a weak portfolio. In terms of labor policies, Tunisia lacks a strong social security system and effective unemployment insurance. Workers' protection has been traditionally achieved by rigid hiring rules favoring open-ended contracts. More flexible contracts in the early 2000s contributed to investments in low-skill and informal jobs in low-value-added activities, away from high-skill jobs. Similarly, agricultural policies have contributed to shifting production away from labor-intensive crops produced in the interior toward crops in the coastal northern regions for which Tunisia is not competitive. Finally, many of the resources that were originally designed to improve people's welfare went unaccounted for and were distributed through clientelistic networks by the ruling party. As recently argued by World Bank (2014a), many have traditionally seen social policy foremost as an instrument of power and control in the hands of a regime that has traditionally discouraged the emergence of a democratic order, insofar as most Tunisians were willing to accept the lack of political freedom as the price to pay for socioeconomic development and welfare.

Welfare trends also question, to a certain extent, the pro-poor nature of growth and its ability to reduce inequalities. On the one hand, evidence from decomposition exercises of poverty reduction strongly connects those achievements with growth. Growth incidence curves show that most Tunisian households' consumption benefited from economic growth, including the poorest segments of the distribution, who saw their consumption grow at a higher pace than the richest segments. The Gini coefficient, the standard measure of monetary inequality, also went down for most periods for which data are available, and, between 2000 and 2010, across all regions in the country. On the other hand, the reduction of inequality among regions was not large in magnitude nor uniform across regions; and while the standards of living of residents in the same region converged, the standards of living of residents of different regions diverged.

The most recent poverty estimates –based on simulations and projections– suggest that poverty rates increased in 2011 immediately after the revolution and decreased in 2012. The poverty impact of the revolution in 2011 oscillates between 0.9 and 2.2 percentage points, depending on the assumptions used to project post-revolution poverty rates. The recovery of GDP and employment in 2012 contributed to reversing the poverty increase of the previous year. All in all, estimated poverty rates in 2012 are slightly below 2010 levels. Projected extreme poverty rates for 2011 and 2012 suggest similar trends. By and large, projections are confirmed when using the alternative methodology, cross-survey imputation. Cross-survey imputation results suggest that poverty rates in 2012 were between 1.1 and 2.2 percentage points above the levels estimated in 2010, depending on the assumptions made to impute consumption across surveys (see Figure a).

Figure a: Poverty and Extreme Poverty Trends, 2000-2012



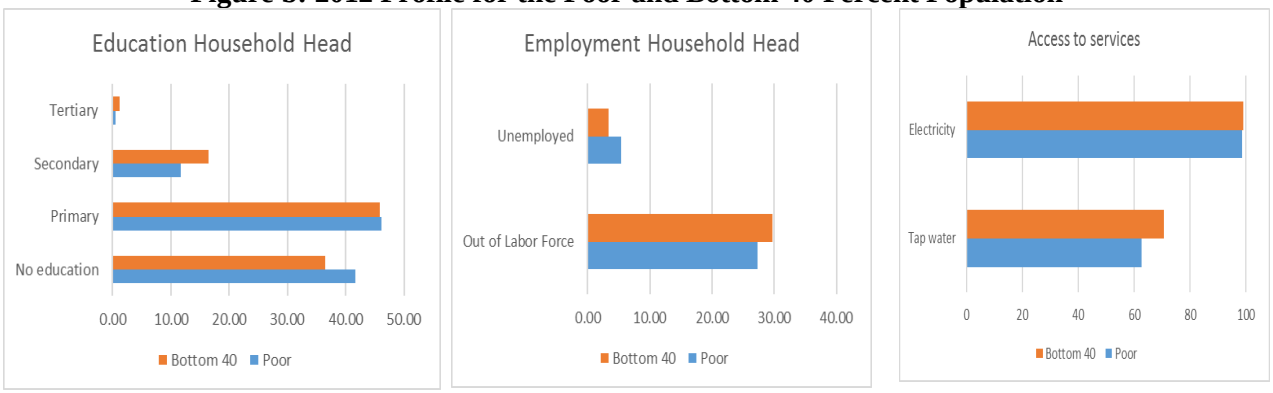
Source: World Bank staff's estimates and INS, ADB and World Bank (2012)

2. The profiles of the poor and bottom 40 percent have not changed in the last decade despite sustained growth and dramatic sociopolitical events.

Most recent profiles are very similar to those observed pre-revolution. In fact, the 2012 profile does not provide evidence in favor of substantial changes with respect to 2010 in most of the tracked demographics, locations, labor, access to services, and asset ownership. The poor in 2012 continued to live in more crowded households than the nonpoor. The share of rural poor exceeded that of the urban poor. In 2012, the poor are concentrated in western regions (60 percent), while only 25 percent of the nonpoor lived in those regions in 2012. The proportion of unemployed poor was 3.5 times larger than the unemployed nonpoor and the sector of activity and profession of the household head still matters a lot to explain the poverty status of the household. Gaps in access to basic services and asset ownership are also found between the poor and nonpoor across the years analyzed.

The bottom 40 percent of the population based on consumption per capita (b40 group) in Tunisia comprises all the poor and a substantive share of nonpoor. So, by the very composition of this group, its socioeconomic profile falls between that of the poor and the nonpoor. Interestingly, the b40 profile aligns itself closer to that of the poor due to multiple factors (see Figure b). The concentration of poor and b40 households geographically is similar in western regions (60 percent of the poor lived in these regions in 2012, and 50 percent of the b40) and contrasts with the concentration of nonpoor in those regions (only 25 percent). Relative to labor, the distribution of sectors among the poor and b40 aligns closely (each category comprising about one-third of working household heads), as is also the case for the professional categories considered in this analysis. Regarding basic services, access rates to tap water, flush toilets, and sanitation services of b40 households are closer to the access rates of the poor than the nonpoor. This close alignment between poor and b40 percent populations is observed for 2005, 2010, and 2012. Evidence also suggests that there have not been substantive changes in the profile of those households within the b40 group in 2005, 2010, and 2012. It is worth noting that, for some of key features profiled (such as demographics or education, for example), the relatively short period of time—two years—passed after 2010, and the technical issues in the cross-survey imputation model on which the identification of the poor in 2012 is based, may all contribute to small estimated changes over time.

Figure b: 2012 Profile for the Poor and Bottom 40 Percent Population



Source: World Bank staff's estimates using ENBCV 2010 and ENPE 2012.

3. Vulnerability continues to be high in Tunisia, which implies that many nonpoor remain at risk of falling into poverty.

Based on the cross-survey imputation model of consumption, the vulnerability to being poor in Tunisia for 2005 and 2010 is calculated as the probability of a household to be poor given their sociodemographic features, geographical location, labor status, access to basic services, and asset ownership. Findings first suggest that shocks of any nature that would have reduced Tunisian households' per capita consumption by 5 percent (that is, TD 41 and 64 yearly in noncommunal areas and cities, respectively) would have led to poverty increases of 2.3 percentage points in 2010. Shocks reducing per capita consumption by 20 percent would have increased poverty levels by almost 10 percentage points. Alternatively, building from a recent internationally accepted definition of households vulnerable to poverty as those nonpoor households with a probability of 10 percent or higher of being poor (Lopez-Calva and Ortiz-Juarez 2014), results for Tunisia suggest that 56 percent of the population in 2005 and still 46 percent in 2010 would be considered vulnerable. As a result, 21 percent of Tunisian households in 2005 and 39 percent Tunisians in 2010 would be considered economically secured along the lines defined by Lopez-Calva and Ortiz-Juarez (2014).

In addition, an analysis of cohorts –groups of people of same age and gender, typically used to understand poverty dynamics– confirms that most cohorts saw their poverty incidence decline between 2005 and 2010, including those with initially higher levels of poverty. Thus poverty reduction has been a generalized trend that has also included the poorer segments of the population. But, interestingly, other segments—cohorts—of the population have also benefited from poverty reduction. All in all, initial poverty conditions and education and age of household head are found to be the most significant determinants of poverty reduction across cohorts in Tunisia, while labor conditions and wealth did not provide additional contributions to reduce poverty over time.

This high vulnerability, increasing poverty and regional disparities likely contribute to **the deterioration of subjective wellbeing and life satisfaction**. Even before the Revolution, an increasing proportion, 30%, of the population reported to be unhappy, widely exceeding the share of poor individuals in the country. This subjective wellbeing measure has substantively worsened after the Revolution, rising to levels close to 40% in 2012 and it might even be larger today amid changes in the perceptions of political and economic stability, public security, quality of public services, corruption or quality of jobs available in the economy, to cite some.

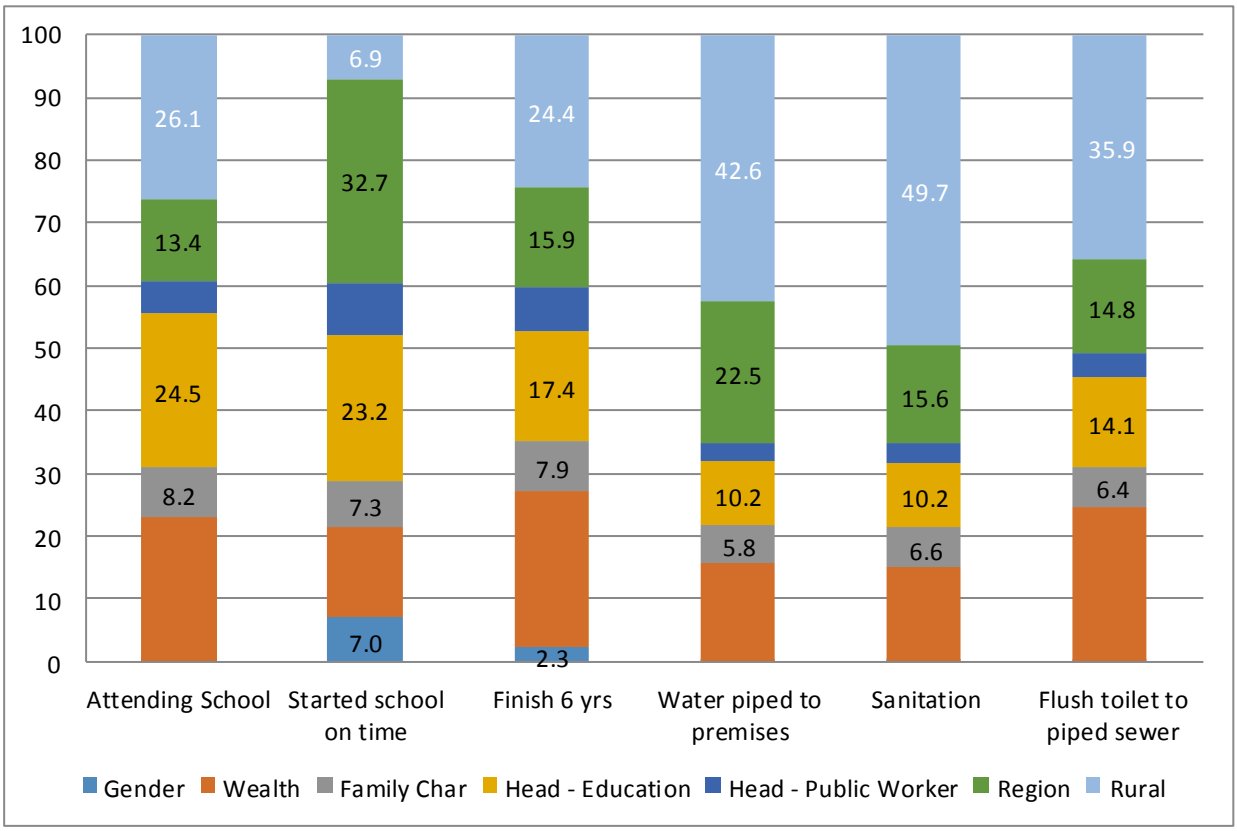
4. The record of equal opportunities in Tunisia is far from impeccable, with education gaps and geography still responsible for unfair lags in some citizens' access to basic opportunities.

Circumstances that individuals are born into, and therefore have no direct responsibility for, do still matter in Tunisia and *unfairly* affect the chances of children to access key basic services needed to lead a decent life. Therefore, unequal opportunities exist in Tunisia. Interestingly, the extent of inequality of opportunities varies by opportunity. Inequality of opportunities is hardly present when it comes to attending school or starting school on time—which is almost universally achieved. However, it matters for education attainment and access to water, and became clearly apparent for sanitation. In fact, Tunisia's record of unequal opportunities lags behind the best performers in the Middle East and North Africa for such services (water and sanitation), is comparable to the average Latin American country, and only better than most African countries.

Addressing unequal opportunities is a key component in the reduction of poverty. Circumstances also affect the vulnerability of Tunisians to fall into poverty, not only access to services. Today in Tunisia, factors other than talent and effort determine to a large extent the chances of Tunisians to become and remain poor. The 10 most disadvantageous population groups have a poverty incidence much higher than the country's average: for example, poverty rates among households residing in western regions headed by a young individual, male or female, with low education are triple the national average.

Robust to the choice of opportunities analyzed, education of the household head, urban/rural location, regional residence, and wealth are systematically the most relevant circumstances to explain unequal opportunities in Tunisia. Combined, they account for between 75 and 90 percent of the total differences in coverage of multiple opportunities across population groups (see Figure c). Interestingly, labor-related circumstances do not seem to have a large impact on unequal access to opportunities. In fact, changes in occupation status between 2005 and 2012 are not aligned with observed poverty trends for many population groups analyzed. It is worth noting, however, that other circumstances such as age, gender, and education also capture experience, extent of gender discrimination and skills, all of which are important aspects of labor markets. So, it cannot be concluded that labor does not matter for creating and maintaining unequal opportunities in Tunisia: rather, the occupation status of a household head alone does not appear to matter much for unequal access to basic services when other circumstances are considered.

Figure c. Relative Contribution of Circumstances to Unequal Opportunities in Tunisia (as percent of the total inequality among population groups)



Source: World Bank staff's calculations

5. Bolder cuts in the current regressive energy subsidies along with better targeted compensations could go a long way to reduce poverty and disparities

According to official sources, subsidies represent 7 percent of GDP. Two-thirds of total subsidies are spent on energy. The current *price*-differentiated structure for residential electricity consumption is progressive while the non-differentiated prices of gasoline, diesel, and LPG are regressive and pro-rich. More precise estimates of energy subsidies suggest that they are all regressive and pro-rich, with gasoline and diesel being the most regressive and LPG and electricity the most pro-rich. In this context, raising electricity prices for consumers and completely removing subsidies for other energy sources would immediately—that is, without behavioral responses from users—increase poverty by 2.5 percentage points. "Easy" compensation mechanisms— that is, either universal or using current structures—will not bring substantive poverty reductions, even if the government channels the entire TD 817.5 million saved from the subsidy reform to poverty eradication (see Table a). Perfect and costless targeting would slash poverty incidence down to 5 percentage points. Yet while this ideal scenario would imply a substantial reduction in poverty, it would still fall short of eradicating poverty, and inequalities would be reduced only in modest terms. Moreover, Tunisia is still far from having such an ideal targeting system with comprehensive and updated lists of beneficiaries and minimal transaction costs. In addition, it should not be expected that all fiscal savings from the energy subsidy be invested back into poverty reduction. Bold reforms of energy subsidies need to be accompanied by equally bold improvements to the targeting schemes of public spending if both poverty and disparities are to be substantively reduced.

Table a. Simulated Poverty and Inequality Impacts of Compensatory Mechanisms after Energy Subsidy Reform

	Fiscal cost of compensation	Average benefit transferred (rounded up)	Number of beneficiaries	Poverty (%)	Inequality (Gini 0–100 index)
Prereform	0	0	0	15.27	36.57
Baseline: Subsidy reform with no compensation	0	0	0	17.84	37.18
Simulation 1: Universal transfer after subsidy reform	TD 817.51 million	TD 75	10.9 million	14.87	36.29
Simulation 2: Current targeting	TD 817.51 million	TD 264	3.1 million	13.83	35.46
Simulation 3: Perfect targeting	TD 817.51 million	TD 420	1.9 million	5.25	34.22

Source: World Bank staff calculations using SUBSIM (subsidy simulations).

6. Multiple interventions integrating water, sanitation, health and food security investments will have positive impacts on child nutrition –a key manifestation of multidimensional wellbeing– but these interventions need to be targeted to specific population groups and locations to be most effective.

Child malnutrition is a salient nonmonetary dimension of welfare that has been long recognized as having multiple impacts on human development, human capital accumulation and future earnings, and requires the successful integration of multisectoral interventions before substantive declines are observed. Even though Tunisia has already achieved its hunger-related MDG and it is a good regional performer, progress toward reducing child stunting has not been steady over time, and socioeconomic differentials still persist in the country. Results from this assessment suggest that adequate access to basic services matters in understanding improved child nutrition in Tunisia. More and better access to improved water and sanitation sources and non-shared toilets are likely to have significant beneficial effects on child nutrition. In fact, adequate access to WASH services is found to more likely have a significant impact on nutrition than food-, health-, and care-related interventions. Estimated effects differ across samples of poor, nonpoor, urban, rural, and poorest quartile of rural households. For policy purposes, progress toward satisfying a strict level of adequacy in water and sanitation or any other dimension of public services alone may not bring the expected gains in child nutrition unless similar gains in other services are also attained. Unbalanced investments in water and sanitation—or for that matter, food, care, or health—might not bring visible nutrition benefits unless they are combined. Yet, there is not a single package of multisectoral improvements that will bring uniform benefits in terms of child nutrition across different types of households. In fact, the effects of improved access across sectoral interventions vary by group and area: "more everywhere" will not do the job either.

A final reflection regarding the analysis of poverty and inequalities in Tunisia.

7. The analysis of poverty and disparities in Tunisia could improve from better integration of and access to data collection

Tunisia is fortunate to have a rich stock of household surveys from which to conduct meaningful welfare analyses. This stock comprises seven household budgetary surveys (ENBCVs), collected every five years from 1980 to 2010, and nine annual ENPEs from 2005 to 2013. Tunisia also has three Multiple Cluster Indicator Surveys (MICSs), collected in 2000, 2006 and 2011–12, and one Demographic and Health Survey (DHS) that dates back to 1988. The latest census is very recent, from 2014. By 2016, Tunisia will also have a new ENPE and a new ENBCV with which to update poverty, inequality, and labor analyses. However, the integration of the different surveys to enhance the analysis of poverty and inequality has so far been rather limited. This is to be expected to some extent, due to the different objectives and focus of each type of surveys. However, other preventable factors magnify the difficulties of mobilizing the whole stock of household surveys for evidence-based policy making. First and foremost, INS only fully releases data for a few existing ENPEs. Out of the nine existing ENPEs, only 2009 and 2011 ENPE household and individual-based data files are publicly available. The 2010 and 2013 ENPEs are not available online—ENPE 2010 is available through a memorandum of understanding—and the remaining ENPEs only report individual data files. Moreover, data files on labor incomes from ENPEs have never been made publicly available on the grounds of anonymity. Another factor is that DHS and MICS collection years do not coincide with ENBCVs, thus making their integration more difficult. There are also important differences in terms of sampling, representativeness, and definitions among these surveys. A less restricted access to existing surveys; specific improvements in terms of consistent definitions across surveys; and a more integrated timing of surveys would surely expand the possibilities for evidence-based policy design in Tunisia.

I: TUNISIA IN CONTEXT: WHAT DO WE KNOW ABOUT PRO-POOR GROWTH IN TUNISIA?

Chapter 1: Introduction

1.1 The Starting Point: A Revolution That Took the World by Surprise

"As a republic with a strong central authority vested in the President, Tunisia has experienced political stability at a time when its neighborhood has been experiencing significant turmoil. Tunisia has committed itself to deeper international integration…Past positive development outcomes have fostered a large middle class that will press for more participation in the development process, greater transparency and accountability through a strengthened role of civil society and the private sector." (World Bank 2004:9)

That is how the World Bank described Tunisian prospects in 2004, a few years before the *Jasmine Revolution.* Shocking the world in January 2011, the revolution took place in a country that for 10 years had grown at an annual rate of 4.5 percent; had managed to halve its poverty incidence from 35 percent to 16 percent in a decade; and had delivered impressive achievements in social development indicators, with close to universal access to electricity and primary education enrollment and substantive reductions in child malnutrition and maternal and infant mortalities. Tunisia has a long tradition of a competent public administration dating back to the 1960s; relatively good infrastructure; strategic proximity to the European market; a skilled labor force; and an established tripartite dialogue process among government, trade unions, and employers' associations (World Bank 2014a). This certainly did not foretell a revolution.

But beyond statistics and indicators, for decades, a less optimistic reality has dominated the economy and society in Tunisia. A cursory review of the socioeconomic and political history of the country makes evident a somber truth that many accounts—both international and national—seemingly overlooked before the revolution.

1.2 Not So Shocking After All: Learning (Late) from History

With its independence in 1956, Tunisia began experiencing progressive social reforms along with a steady concentration of political power and economic decision making. A dominating state-led model emerged during the 1960s at the time when the country was building its infrastructure and administrative and financial institutions. State banks and state-owned companies were also created in vital sectors of the economy at the cost—according to most analysts—of preventing a strong and vibrant private sector (World Bank 2014a).

In the 1970s, Tunisia changed course toward a program of economic liberalization in response to the world crisis (and ailing socialist advances related to collectivization of land; Ayadi et al. 2005). Some state-owned enterprises were privatized. An investment code was introduced deliberately aimed at promoting export-oriented growth. Growth and job creation boomed. However, the liberalization process did not prevent price control practices and lucrative parts of the economy were heavily protected from external competition (World Bank 2015a). Flourishing export-oriented enterprises were concentrated in a small number of regions, which resulted in urbanization to the northeast and widening regional disparities that continue today. Mounting social discontent led to a general strike in 1978. Socioeconomic instability continued brewing in the following years associated with the massive return of Tunisian workers from Libya and the rise of Muslim political movements. At that point, Tunisia embarked on an International Monetary Fund (IMF)–supported structural adjustment program in 1986. In addition to preserving macroeconomic stability, the program also aimed at further integrating the Tunisian economy into the world economy in the hope that this would also reduce poverty and economic disparities. Results from the

structural adjustment program have been typically assessed as favorable, as domestic and external deficits were curtailed at a "relatively small" short-run cost in terms of growth, poverty, and inequality (although higher in terms of unemployment [Ayadi et al. 2005, 8]).

After a constitutional coup, Ben Ali seized power in 1987. High economic growth and prudent macroeconomic policies constituted key priorities. Higher levels of political stability were achieved, but involved repression and suppression of Islamic aspirations, preventing Ennahdha from gaining access to office after their successful electoral performance in 1989 (Tamimi 2013). Ben Ali embarked on further attempts to integrate Tunisia into the world economy and revitalize its competitiveness. Tunisia acceded to the World Trade Organization in 1995, implemented numerous free-trade agreements with main partners, and sought an association agreement with the European Union (fully implemented in 2008). In parallel, a host of programs and interventions sought the consolidation of tax and financial legislations reforms; more deregulation of investments, trade, and prices; rebalancing of the roles of the public and private sectors; modernization in the administration of the financial and banking systems; and improvements in infrastructure (World Bank 2014a).

In the absence of democratic progress, Ben Ali used social policy as a legitimacy instrument. The level of public expenditure for social policies remained consistently high, at around 19 percent during 1987–2005, doubling the expenditure on health and education (Ben Romdhane 2007). Minimum wages were also used to compensate for reductions in food subsidies and, at the end of his tenure, generous subsidies were used to appease social tensions. Programs deliberately aimed at helping the poor were created: the National Programme for Aid to Needy Families (1986), the National Solidarity Fund, also known as "26–26" (1992), and the National Employment Fund, dubbed "21–21" (2000), to improve basic infrastructure in deprived areas and promote employment opportunities. Significant development of rural roads also sought to benefit the poor by improving the rural poor's ability to access urban markets for their agricultural and livestock production (Ayadi et al. 2005).

Ironically, the use of generous social policies took its toll in the form of a pervasive lack of civil and political liberties. Many of the resources that were originally designed to improve people's welfare went unaccounted for and were distributed through clientelist networks by the ruling party (Kallander 2011). The ruling party itself directly approved the list of families that benefited from state social services. The regime eventually inhibited the chances for Islamists to gain terrain in poorer areas (Harrigan and El-Said 2009). Social policy thus served to discourage the emergence of a democratic order insofar as most Tunisians were willing to accept the lack of political freedom as the price to pay for socioeconomic development and welfare (Ben Romdhane 2007). However, this current report dubs "development before democracy" as a highly risky and shortsighted strategy. And so it proved to be for Tunisia. If successful, it might eventually lead to unrelenting democracy aspirations of a more prosperous society—as China and the Asian Tigers demonstrated—and, if a failure, it might increase both the demand for freedom and development, thus causing social and political tensions to increase along with poverty and disparities. Neither had "development before democracy" to be an inevitable strategy in Tunisia. The well-known modernization theory (Lipset 1959; Rostow 1960; Jackman 1973; Acemoglu and Robinson 2001, 2005; Boix and Stokes 2003; Inglehart and Welzel 2005; Robinson 2006)[1] argues that it is possible to both

[1] Economic growth and increasing incomes favor better collective action among (nonelite) citizens demanding democracy; increase the costs of concessions (from elites) to maintain authoritarism; increase the costs of repression to pro-democracy opposition; and favor changes in the economy and its institutions (from agrarian to industrial and post-industrial economies) that facilitate the functioning of a democracy over lack of freedom (Robinson 2006). Robinson (2006) also argues that whether economic growth takes place with increasing or decreasing inequality is essential for democratic aspirations, and at low levels of inequality, increasing inequality may facilitate democracy. But if inequality gets too high, democracy becomes less likely because elites use repression. However, empirical and historical evidence are inconclusive in terms of an unequivocal role of inequality on democratization (Wucherpfennig and Deutsch 2009).

increase democratization along with prosperity. Ultimately, regardless of its legitimatizing function and its contributions to improve Tunisians' welfare, many still see social policy foremost as an instrument of power and control in the hands of the regime (Hibou 2006; Ben Romdhane 2007; Paciello 2011)[2] and the limiting freedom on behalf of economic growth—and, as seen below, limited inclusion—a strategy that should have not been expected to be sustainable over time.

1.3 The True Paradox in Tunisia: Pro-Poor Growth with Limited Inclusion

The Tunisian economy grew at an annual rate of 4.3 percent during 1980–2010, and at 4.5 percent since 2000. Yet, the economy has been mired in low-wage low-productivity jobs with a state-led model that is stifling competition while feeding cronyism; and regional disparities—coastal versus interior—persist due to the lack of broad social inclusion. These economic vulnerabilities have long hindered the Tunisian economy. Critically, the Tunisian economy has low productivity, which has resulted in insufficient and low-quality jobs creation figures and a high unemployment rate. According to the World Bank (2014a, 42), about 95 percent of Tunisia's observed growth between 1990 and 2010 is explained by factor accumulation, and only 5 percent is due to total factor productivity.[3] Unemployment has never achieved single digits throughout its monitored history. Inequality, measured by the Gini coefficient, stalled in the 2000s at a relatively high range of mid-30s (out of a 100 point scale), even in the presence of robust economic growth and poverty reduction.

Several fundamental features of the Tunisian economic model have simultaneously failed to bring about more productivity and inclusion (World Bank 2014a). Its **investment** policy is founded on a separate treatment of companies producing for export (offshore) and domestic (onshore) markets. A highly protected onshore sector (about 50 percent of the economy) is characterized by low-productivity firms surviving thanks to the privileges and protection in the form of entry barriers. The other half of the economy open to competition does not demand services and intermediate goods produced by the onshore sector due to low quality, high prices, and substantive bureaucratic burdens of dealing with domestic regulation.[4] The result is greater imports of (tax free and higher quality) intermediate products; fewer domestic jobs; low demand for high-skill workers; and low salaries. Incentives to attract investments and stimulate job creation are highly concentrated in sectors that are not labor intensive and in the coastal regions, thus exacerbating regional disparities (World Bank 2014a).

Vital sectors of the economy have been hindered by excessive **regulatory** policies. In fact, the numerous regulations have reportedly led to many legal monopolies and omnipresent restrictions on a long list of key sectors of the economy such as water, electricity, telecommunications, roads, air transport, tourism, health and education, among others (World Bank 2014a). World Bank (2014b) estimates that 13 percent of firms' annual sales are devoted to regulation-related expenses, which constitutes a "tax" that reduces firms' competitiveness and induces small firms to remain informal. Further, the sustainability of the entire **financial system** is at risk because of the lack of competition and a weak portfolio, with three large state-owned banks accounting for about 40 percent of the sector. Heavily regulated market access has created opportunities for rent extraction. World Bank (2014a) estimates that firms owned by the Ben Ali's clan represented about 21 percent of total net benefits of all private firms in Tunisia (or about 0.5 percent of

[2] A few disagree, however, Ayadi et al. (2005) stresses the high degree of political will and commitment needed to implement a social spending policy clearly destined to improve living conditions, including those of the most disadvantaged, and create employment opportunities.

[3] The meager contribution of 5 percent to economic growth by factor productivity rises to 33 percent if total factor accumulation adds to human capital accumulation (Ayadi et al. 2005).

[4] Even though Tunisia exports finished products, including some high tech goods like sewing machines, television sets and medical instruments, Tunisia does not *produce*, but simply assembles these products (World Bank 2014a).

total GDP [gross domestic product]). Furthermore, fear among Tunisian entrepreneurs of attracting attention from government officials—which might lead to expropriation—has led to a rational response of an "under the radar, stay small" strategy that discourages productivity growth and limits job creation (World Bank 2014a). Compounding these disincentives are gaps in Tunisia's **labor** policies. Tunisia lacks a strong social security system and effective unemployment insurance. Instead, workers' protection was achieved by rigid hiring rules favoring open-ended contracts. But in the early 2000s, adjustable fixed-term contracts were introduced to allow firms more flexibility. Such contracts are reported to have contributed to investments in low-skill and informal jobs in low value-added activities, and away from high-skill jobs. Similarly, **agricultural** policies have contributed to shifting production away from labor-intensive crops produced in the interior toward cereals, beef, and milk produced in the coastal northern regions, and for which Tunisia is not competitive. In addition to regional disparities, the subsidies (of about 0.8 percent of GDP) are also thought to increase inequalities, since coastal producers for exports tend to be larger landowners than smallholders in the interior.

All of these economic policy miscues actively hindered the broadening of social inclusion in Tunisia. All of the jobs that could have been created, but were not, are missed opportunities for integrating the unemployed into the economy. Consumers as a whole pay higher prices for products from monopolistic and heavily regulated industries. Because only a few people have access to those in power and the ability to capture benefits, the majority of Tunisians missed these economic opportunities, leading to deep feelings of social injustice and frustration. The underwhelming prosperity and increased sense of social injustice generated by the regime's economic model made the intrinsically risky "development before freedom" strategy in Tunisia more likely to fail.

1.4 Today's Difficult Trade-Off: Abrupt Economic Overhaul versus Social Stability

The constraints in the economy and the strong feelings of social injustice may have not only prompted the demise of the Ben Ali regime, but may have also raised important post-revolutionary challenges. Marginal reforms to a model stuck for decades in low productive activities, regionally biased, mired in cronyism and exclusion from economic opportunities will not be sufficient. Instead, the inevitable economic overhaul needed to bring about inclusive prosperity is of a large caliber, involving deep changes in the regional development strategy, investment incentives and consumption subsidies, just to name a few. Such changes—especially on consumption subsidies—threaten to produce a social instability on its own that renders reform implementation more difficult in the first place. This catch-22 situation has recently deteriorated, with highly visible terrorists attacks from Islamists (at the Bardo Museum in Tunis and Port El Kantaoui) making Tunisia even more vulnerable to social tensions.

In effect, during the transition period (2011–14), the country navigated through social and security tensions; slow growth; and spillovers from regional conflicts, such as the Libyan civil war. Alongside its political transition, Tunisia also embarked on economic reforms aiming at macroeconomic stabilization in the short run, while laying the foundation for more inclusive growth on a longer timeline. Chief among the interventions needed for inclusive growth is the recapitalization of public banks and a more decisive strategy for protecting the vulnerable (World Bank 2015b; IMF 2014a). Progress has been mixed in the implementation of that structural reform agenda (IMF 2014a), and large external and fiscal balances, high unemployment, and increased banking fragilities still remain main challenges. Likewise, progress toward a better-targeted social safety net is taking place against a backdrop of a pension system that is in need of urgent reform to ensure financial sustainability (ibid).

Despite these difficulties, by mid-2015, Tunisia had, by most accounts, completed a successful *political* transition that culminated in fair legislative and presidential elections. Undeniable progress toward a new consensus took place during the transition period. That consensus, enshrined in the Social Agreement

(*Pacte social*), paved the way for the drafting of the new constitution (World Bank 2015a). The pact covers industrial relations and social protection, employment and vocational training policy, and underlines the importance of social dialogue as a genuine pillar of a democratic transition toward greater social justice. The general agreement is that the constitution represents a compromise across all political fronts[5] that has created a space for "public debate" that had not previously existed in Tunisia (World Bank 2015a).

The new administration has set as key priorities focusing on lagging regions and rebuilding the trust between citizens and the state. It has launched an active program to favor economically disadvantaged regions, including civil society and media as meaningful participants in the process. The new government clearly understands that social stability will depend critically on its ability to listen to and communicate with citizens and to ensure that any action taken on the identified priorities is recognized by the population as a step forward toward a more inclusive development model (World Bank 2015a). In fact, Tunisia has seen a deterioration of subjective wellbeing and life satisfaction, which started even before the Revolution, while monetary poverty rapidly dropped to 15.5 percent after decades of sustained reduction. Even in that context, a much higher and increasing proportion, 30%, of the population reported to be unhappy. This subjective wellbeing measure has substantively worsened after the Revolution, rising to levels close to 40% in 2012 (Dang and Ianchovichina 2015). It might even be larger today amid increasing poverty, widening regional disparities and potential changes in the perceptions of political and economic stability, public security, quality of public services, corruption or quality of jobs available in the economy, to cite some (World Bank 2016).

Ultimately, the success of the changes already initiated and the ability of the country to meet its short- and long-term—economic, social, and political—objectives remains to be seen, more so in the context of demanding structural reforms, increasing instability caused by terrorism and increasing dissatisfaction among citizens. This poverty assessment does not assess the ability of Tunisia to succeed or provide a solution to Tunisian short- and long-term social, economic and political prospects, nor does it aspire to find the right equilibrium between the depth and pace of reforms and a durable stability. Instead, it aims at providing original and additional evidence on the magnitude of the poverty and inequality challenge that Tunisian citizens, population groups, and regions really confront. It does so by analyzing poverty and inequality trends, drivers, and regional disparities after the revolution, a period for which little hard evidence exists. The analysis also provides further evidence on issues of vulnerability, equal opportunities, and distributive capacity of public policies to redress such gaps.

1.5. The Need For a Fresher Look at Poverty and Shared Prosperity in Tunisia

In light of these complex trends and challenges, this report aims at providing a fresh look at the issues of poverty and inequality—including shared prosperity—in Tunisia. The analysis focuses on several new approaches and issues not covered in previous studies in Tunisia. Of these, this report first looks at poverty trends post-revolution, that is, after 2010. To do so, it combines projection techniques with survey-to-survey imputation methods merging consumption models across surveys—National Survey on

[5] This political compromise includes Ennahdha, who had a total of 85 seats out of 217 within the National Constituent Assembly, and the other political parties with more secular tendencies. Extensive deliberations were held especially around the topics related to the national identity of the country, the place of Islam, the definition of rights and freedoms, and the equality between men and women. It took more than two years to complete every article of the new constitution. Civil society (including trade and business unions) was very vigilant and influential during the drafting process. Over 6,000 citizens, 300 civil society organizations, and 320 university representatives provided input to a nationwide dialogue on the constitution. The document was approved, in the end, by an overwhelming 200 of Tunisia's 216 members in the National Constituent Assembly.

Households' Budget and Consumption (ENBCV) and the Labor Force Survey (ENPE)—and over time, that is, 2010 ENBCV and 2012 ENPE. Chapter 2 details those techniques and updates poverty estimates.

Secondly, this report provides a more comprehensive look at poverty profiling in Tunisia, both before and after the revolution. Benefiting from the knowledge currently existing (presented in this chapter), the proposed poverty profile expands the dimensions previously analyzed for 2010 (and before), and then expands this analysis to 2012. It also applies the analysis to the bottom 40 percent of the population, consistent with new approaches looking at a broader and more inclusive concept of growth known as "shared prosperity." Chapter 3 reports the results of this *enhanced* profiling.

Third, this poverty assessment explores the drivers of poverty, adding a few innovations to the work completed to date. Chapter 4 triangulates evidence on poverty, vulnerability, and mobility using a common framework of drivers to tie together these related, but different, concepts of welfare. The analysis expands the traditional notion of vulnerability as "closeness" to the poverty line. It instead bases the analysis of vulnerability in terms of opportunities or, more specifically, inequality of opportunities—associated to key basic services. The vulnerability analysis, outlined in chapters 5 and 6, examines the extent to which labor drives unequal opportunities in Tunisia. With this fresher look, these drivers are grouped by sociodemographic characteristics, location of residence, labor status, access to key basic services, and ownership of assets (and consumer durables). This analysis of drivers is then formalized in an econometric analysis that helps understand the roles of different factors, along with initial conditions, in driving poverty changes.

Fourth, the role of policies is carefully analyzed. The assessment explores the poverty and distributional implications of the single most important safety net intervention—at least in magnitude—in Tunisia: energy subsidies. Chapter 7 analyzes the impact that the recent post-revolution changes have had on poverty, inequality, and fiscal balances. Equally importantly, it shows the absolute relevance of linking energy subsidy reforms with other safety net mechanisms, specifically, better-targeted cash transfers. All of this analysis is conducted through simulations of several policy reform scenarios that substitute for a concrete reform proposal currently being discussed.

Lastly, this report examines issues regarding the effectiveness and synergy of Tunisia's public interventions. Specifically, the focus is on multidimensional, integrated, and synergistic interventions in the area of child malnutrition, taking advantage of a holistic food security framework developed by the United Nations Children's Fund (UNICEF). Child malnutrition in Tunisia has improved over the last decades, but progress has not been sustained and socioeconomic differentials persist. While the UNICEF food security framework, which underscores the importance of multiple interventions for successful reduction of malnutrition, is well known, it has not been previously applied in empirical studies. Tunisia constitutes one of the first applications. This assessment (developed in chapter 8) suggests that investments in one sector alone are unlikely to deliver the needed improvements, unless accompanied by multisectoral progress. But not *any* set of multiple interventions should be expected to generate desired synergies in reducing malnutrition among Tunisian children. Thus, different contexts may require a different set of interventions to be effective: one size does not fit all.

This fresher look at poverty and disparities in Tunisia has as its final objective—to fill some of the gaps in current knowledge about poverty and inequality trends in the country. The areas selected for analysis respond to three intermediate objectives:

(i) shed more light on poverty incidence after the revolution, even though the latest available ENBCV to calculate poverty rates dates back to 2010, and a new ENBCV (to be collected in 2015) is not expected to be available until 2016;

(ii) use a combination of traditional instruments and more sophisticated tools to measure poverty, analyze poverty dynamics, and simulate the effects of certain policy reforms; and

(iii) strengthen the understanding of the links between poverty, disparities, vulnerabilities, and equal opportunities in Tunisia.

Consistent with these objectives, this poverty assessment aims at addressing the following questions:

Q1 Did poverty in Tunisia increase after the revolution?

Q2 Who are the post-revolution poor and the bottom 40 percent (b40) population?

Q3 What factors have caused poverty to decline in the last decade?

Q4 Has vulnerability to poverty increased in Tunisia in the post-revolution period?

Q5 To what extent is Tunisia an equal opportunity society? What is behind unequal opportunities in the country?

Q6 Can reforms to energy subsidies substantially improve poverty and inequality in Tunisia?

Q7 How can public policy be more effective in improving the living conditions of Tunisian households?

It is worth noting that current knowledge on poverty and inequality in Tunisia—as reviewed in chapters 2 and 3—does not come from sophisticated analytical models, either partial or general equilibrium models. Recently, however, analytics in Tunisia have benefitted from the use of computable general equilibrium (CGE) models to understand the costing implications of Millennium Development Goals (MDGs; Chemingui and Sanchez 2011) and simulation techniques to understand the distributive implications of subsidies (World Bank 2013b). Interestingly, existing CGE modeling has not yet analyzed the implications of several domestic policies and external shocks on poverty and have used 2005 as reference year. In this regard, the assessment attempts to overcome some of these limitations by providing new techniques to the analytical landscape in Tunisia. This is, in effect, the application of survey-to-survey imputation to approach poverty incidence in 2012. This is also the case of the Human Opportunity Index–based framework of unequal opportunities developed by the World Bank to analyze the links between poverty, opportunities, and labor markets. Subsidies will be analyzed using the recently developed SUBSIM simulation model (Araar and Verme 2012) and pioneered in Middle Eastern and North African countries. The analysis of synergies among policy interventions will benefit from a recent econometric application of the UNICEF food security framework pioneered by Skoufias et al. (forthcoming). These techniques will add value to standard poverty profiles, mobility and poverty dynamics analyses.

It is also worth noting that the proposed questions in this poverty assessment do not address *all* the issues related to poverty and disparities, nor will this report produce definite answers to all the identified questions. For instance, incidence of poverty post-revolution does not go beyond 2012, even when using survey-to-survey imputation techniques. Also, poverty profiles post-revolution are based on the *imputed* distribution of consumption rather than *observed* consumption. In so far as imputed distributions of consumptions come from a model that assumes a similar behavior over time, the resulting profile can be understood as a first-round diagnostic of poverty post-revolution. As a result, the comparison of pre- and post-revolution profiles is illustrative and tentative rather than conclusive. Another example is the analysis of poverty drivers. Results from the econometric analysis cannot—should not—be automatically interpreted as causality effects in the presence of more than likely reverse causality among poverty and labor decisions, asset ownership, and access to public services. Furthermore, the analysis of drivers does not include explicitly social benefits, which are analyzed separately. And the separate analysis of social

interventions is limited to energy subsidies and malnutrition-related interventions. Even if comprehensive, the analysis is not complete.

There are several reasons why the analytics in this assessment are incomplete. First and foremost, limitations in terms of both data quality and access prevent the assessment from providing a more recent analysis of poverty trends than 2012 and including dimensions such as health, food subsidies or cash transfers. Box 1 details what are those limitations and what are their implications. Secondly, even the most cutting edge techniques proposed have their intrinsic limitations, as discussed in each of the chapters. Finally, a proper—and deeper—analysis of policy interventions would require a more comprehensive sector analysis. This is, however, beyond the scope of this poverty assessment and have been or are currently covered—to different extents—by more comprehensive initiatives such as the Systematic Country Diagnostics (SCD) and Country Partnership Framework (CPF) being developed by the World Bank (2015a, 2015d), the recent development policy report (World Bank 2014b), development policy loan (World Bank 2015b), regional jobs diagnostics (World Bank 2013a), the Tunisia jobs report (World Bank 2015e), and labor and social protection sector notes (World Bank 2015f). Ultimately, this poverty assessment seeks to complement and contribute added value to—rather than substitute or replicate—existing knowledge from previous analyses.

Box 1. Data Limitations for the Analysis of Poverty in Tunisia

Tunisia has a rich stock of household surveys. This stock comprises seven household budgetary surveys (ENBCVs), collected every five years from 1980 to 2010, and nine annual labor force surveys, from 2005 to 2013. In addition, Tunisia has three Multiple Cluster Indicator Surveys (MICs), collected in 2000, 2006 and 2011–12, and one Demographic and Health Survey (DHS) from 1988. The World Bank also collected a dedicated survey on youth employment in 2012. The latest census was conducted in 2014, and updates the previous census of 2004.

This extensive array of surveys enables analysis of a wide range of poverty- and inequality-related issues over time and across space. However, the integration of the different surveys to support the analysis of poverty and inequality has proven rather limited. This is to be expected to some extent, because of the different objectives and focus of each type of survey. However, other preventable factors magnify the difficulties in mobilizing the whole stock of household surveys to analyze poverty and disparities in Tunisia.

First and foremost, at this moment, only a few of the existing labor force surveys (ENPEs; by the *Institut National des Statistiques* [INS]) fully release data to the public. Out of the nine existing ENPEs, only the 2009 and 2012 ENPE rounds make both household and individual-based data files publicly available. The 2010 ENPE is not available on line—though it was made available to the World Bank through a memorandum of understanding. The remaining ENPEs only report the individual data file. Moreover, on the grounds of anonymity, data files on labor incomes from ENPEs have never been made publicly available for analysis. Second, DHS and MICS collection years do not coincide with ENBCV collection surveys, thus making their integration more difficult. Third, there are important differences in terms of sampling, representativeness, and definitions among these surveys. For example, ENBCV is, in practice, the only survey that reports a monetary metric to measure poverty—household expenditures. No other survey provides expenditures or incomes. MICSs are representative of the population of women and children, but not the entire population. The definition of urban areas has changed over time, and ENBCV recently began differentiating cities from small and mid-sized towns, while ENPEs do not make this distinction. Also, differences in the enunciation of questions concerning education make the comparison of educational attainment between ENBCV and ENPE difficult. Finally, the sets of access to basic services and ownership of assets and consumer durables that are monitored in ENBCV and ENPE are not identical. ENBCVs typically provide information on more services and assets than ENPEs, but do not include quality considerations of basic services such as MICS do.

Despite these difficulties, this poverty assessment expands the integration of data across surveys by imputing ENBCV-based consumption models into ENPEs (chapter 4) and incorporating MICS-related quality variables on access to basic services in the analysis of synergies among policies (chapter 9). Increased access to existing surveys and punctual improvements in terms of consistent definitions across surveys would surely greatly expand the possibilities of survey integration in Tunisia.

Source: World Bank staff.

Chapter 2: Poverty, Inequality, and Growth in Tunisia

2.1 The Good News: Pro-Poor Growth between 1980 and 2010

Poverty reduction in Tunisia has been consistently showcased as a "model" for other developing countries (World Bank 1995a). Ayadi et al. (2005, 41) conclude that "with limited resources and poor natural endowments both a good growth performance and a significant reduction in poverty can be achieved in a relatively short period of time." In November 2009, before the Jasmine Revolution, World Bank (2009) highlighted the substantive achievement of the country in terms of reduction of poverty, *equitable growth,* and social progress [author's emphasis].

However, assessing poverty reduction achievements in Tunisia is not straightforward. Until 2012, different methodologies existed to measure the incidence of poverty. That year, a joint *Institut National des Statistiques* (INS), African Development Bank, and World Bank (2012) methodological revision aligned the official measurement of poverty for the years 2000, 2005, and 2010. Prior to this methodological convergence, the INS and the World Bank used different methodologies (appendix 1), leading to large discrepancies (table 1). Despite their discrepancies and regardless of the methodology used, INS or World Bank, total poverty incidence between 1980 and 2000 declined (table 1).

This poverty reduction trend is observed in both urban and rural areas. However, it remains unclear which were the specific contributions of rural and urban poverty reductions to the overall decline in poverty in that period. According to World Bank's estimates, the initial poverty incidence in 1980 was four times higher in *urban* than in rural areas. Urban poverty reduction was larger than rural poverty in those two decades and, as its result, the remarkable reduction in total poverty over the period 1980-2000 was mainly due to reduction in urban poverty. In contrast, according to the INS, the incidence rural poverty was much closer to urban poverty in 1980 than the World Bank's estimates suggest. INS estimates also suggest that the overall reduction in poverty between 1980 and 2000 came from a more balanced reduction of both rural and urban poverty rates.

Table 1. Extreme Poverty Incidence in Tunisia, 1980–2000

	Total		Rural		Urban	
Year	INS	World Bank	INS	World Bank	World Bank	World Bank
1980	12.9	20.1	11.8	7.7	14.1	30.1
1985	7.7	9.6	8.4	4.0	7.0	17.2
1990	6.7	6.7	7.3	3.0	5.7	12.7
1995	6.2	8.1	7.1	3.2	4.9	15.8
2000	4.2	4.1	4.9	1.7	3.9	8.3

Source: Ayadi et al. (2005); World Bank (2004) using ENBCV 1980, 1985, 1990, 1995, and 2000.

The INS and World Bank joint methodology adopted in 2012 re-estimates poverty lines for 2000 and revises the poverty incidence from that year on (see Appendix 1). Consequently, it provides a single and consistent set of extreme and moderate poverty estimates for 2000, 2005, and 2010. Reported in table 2, the new poverty estimates unambiguously conclude that both extreme and moderate poverty incidences went down in Tunisia between 2000 and 2010, a trend that is consistently observed among cities, small and medium towns, and noncommunal (or rural) areas. This declining trend was also observed across all regions in Tunisia. A second conclusion drawn from these results is that growth had been *pro-poor* during this period. Pro-poor growth is understood in this analysis along the lines of Ravallion and Chen's (2003)

and Kraay's (2003) definition of a growth capable of reducing poverty in absolute terms, regardless of its distributional consequences—that is, irrespective of the welfare effects that growth brings about to the nonpoor segments of society.[6] In effect, in Tunisia, GDP growth averaged an annual rate of 4.3 percent between 1980 and 2000, and 4.5 percent between 2000 and 2010 alongside sustained reductions in poverty incidence (figure 1).

Table 2. Incidence of Poverty in Tunisia, by Stratum and Region, 2000–2012

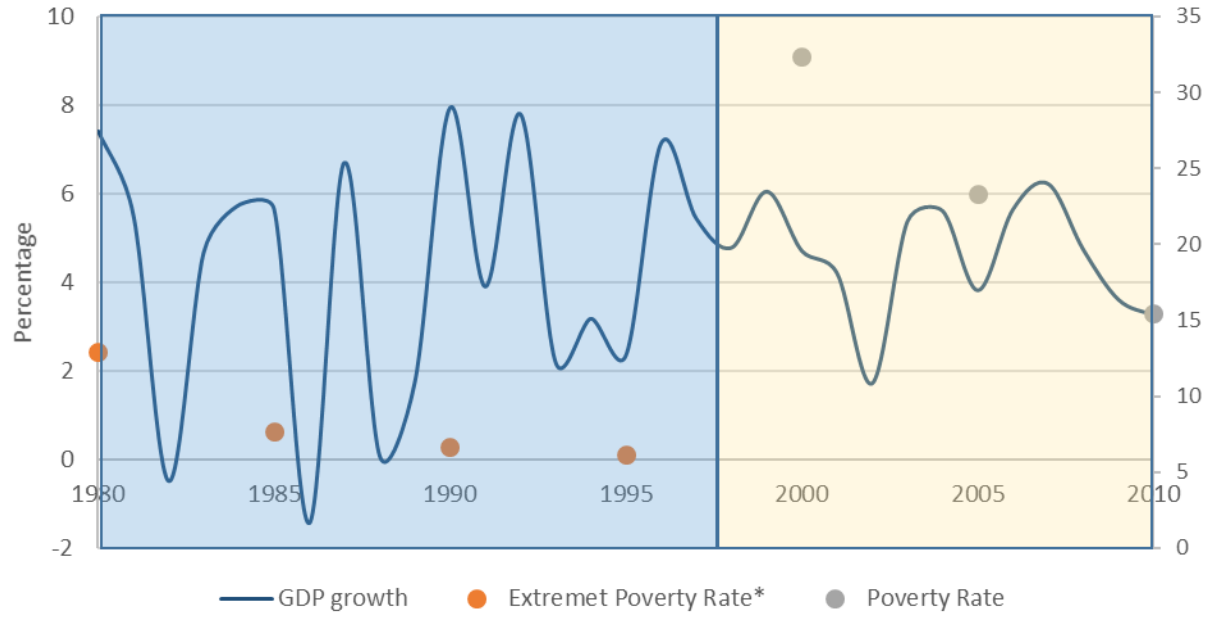
	Poverty line			Extreme poverty line		
	2000	2005	2010	2000	2005	2010
	32.4	23.3	15.5	12.0	7.6	4.6
	(0.8)	(0.7)	(0.6)	(0.5)	(0.4)	(0.3)
By stratum						
Cities	21.5	15.4	9.0	4.3	2.2	1.3
	(1.4)	(1.1)	(1.0)	(0.6)	(0.4)	(0.3)
Small and	32.5	22.1	14.0	10.5	6.5	2.9
medium towns	(1.3)	(1.1)	(0.9)	(0.8)	0.6)	(0.4)
Noncommunal	40.4	31.5	22.6	19.1	13.4	9.2
areas	(1.3)	(2.6)	(0.6)	(1.0)	(0.9)	(0.8)
By region						
Greater Tunis	21.0	14.6	9.1	4.3	2.3	1.1
	(1.7)	(1.2)	(0.6)	(0.7)	(0.4)	(0.3)
Northeast	32.1	21.6	10.3	10.5	5.4	1.8
	(2.1)	(1.6)	(0.6)	(1.2)	(0.8)	(0.5)
Northwest	35.3	26.9	25.7	12.1	8.9	8.8
	(1.9)	(1.9)	(0.6)	(1.2)	(1.1)	(1.2)
Center east	21.4	12.6	8.0	6.4	2.6	1.6
	(1.4)	(1.1)	(0.6)	(0.9)	(0.4)	(0.4)
Center west	49.3	46.5	32.3	25.5	23.2	14.3
	(2.0)	(2.1)	(0.6)	(1.9)	(1.7)	(1.5)
Southeast	44.3	29.0	17.9	17.5	9.6	4.9
	(2.4)	(2.2)	(0.6)	(1.9)	(1.7)	(1.5)
Southwest	47.8	33.2	21.5	21.7	12.1	6.4
	(2.5)	(2.6)	(0.6)	(2.1)	(1.6)	(1.3)

Source: INS, ADB, and World Bank (2012).

Beyond numbers, multiple analysts conclude that choices in the composition of economic growth and other developmental strategies pursued a deliberate poverty reduction objective. Ayadi et al. (2005), Bibi (2005), Chemingui and Bchir (2008), Chemingui and Sánchez (2011), World Bank (1995a, 2004, 2009) all consistently make this argument. Even after acknowledging the limitations of the Tunisian economic model (presented in chapter 1), those analysts underscore a common pro-poor bias of the successive economic strategies consistent with a commitment to a type of growth able to reduce poverty. It is that unambiguous commitment to poverty reduction in Tunisia, they argue, that explains its sustained poverty reduction trends throughout successive decades and distinctive growth periods, from low economic growth (1980–85), to macroeconomic stabilization and adjustment years (1985–90) and a faster economic growth (1990–2010) post adjustment (Ayadi et al. 2005).

[6] Another stricter definition of pro-poor growth requires that incomes or consumption of the poor grow faster than the rest of the population, thus leading to reductions in inequality. In other words, poverty reduction is larger than the level that would have been attained from a uniform increase of the incomes or consumption of all groups in society (Klasen 2001; Kakwani and Pernia 2000; McCulloch and Baulch 1999).

Figure 1. GDP Growth and Poverty Trends, 1980–2010



Source: World Bank staff's calculations based on World Development Indicators; Ayadi et al. (2005); World Bank (2004); INS, ADB, and World Bank (2012).
Notes: Poverty rates on right-hand axis.

Those pro-poor growth strategies refer to the development of an export-oriented labor-intensive sector (inclusive of low-skilled females) such as textile and garments manufactures; the expansion of the tourism industry; control of inflation; increasing investments in rural agriculture; and generous food subsidies that facilitate and incentivize the increase in agricultural output. Other interventions reportedly with poverty reduction objectives were also implemented, such as: increases in minimum wages; strong investments in human capital (including education) and birth control programs; rural development programs that expanded infrastructure, roads, water supply and sanitation; generous—although poorly targeted—subsidies; and microcredit programs such as the "Solidarity Bank" (albeit limited in the scope of credit disbursed and employment created; Ayadi et al. 2005). Social assistance programs launched since 1985 include the National Program of Assistance to the Needy Families, aimed at the elderly poor, poor widows, and the handicapped; several funds for employment creation and productive capacity-building and training programs; and social investment funds, such as the National Solidarity Fund, to develop infrastructure (roads, housing, electrification, potable water, or schools) benefiting the poor. Overall, in recent years, social spending—on education, consumption subsidies, health, direct cash transfers and in-kind social assistance and active labor market programs—comprises about 40 percent of total public spending, or 25 percent of GDP in Tunisia (World Bank 2015a).

2.2 Beyond Growth and Poverty Reduction: Group Inequalities and Regional Disparities

In contrast to the thesis of an unambiguous commitment to growth with poverty reduction in Tunisia, the World Bank (2014a, 2015a; see chapter 1 arguments) stresses that missed opportunities to simultaneously increase productivity and economic growth have led to reducing poverty while increasing regional and group disparities and deepening the perceptions of social injustice. The strategy labeled in chapter 1 as "development before democracy" was shortsighted in thinking that growth and poverty reduction would quell freedom demands without achievements in terms of more inclusion and fewer disparities.

These two views lead to an obvious question: to what extent did economic growth in Tunisia reduce disparities? A first piece of evidence shows that growth has been the main contributor to the observed reduction in poverty, while the contribution of redistribution has been meager. Using the Datt and Ravallion (1992) method of poverty decomposition, Ayadi et al. (2005) report that household consumption growth explains about 82 percent of the total poverty reduction observed between 1980 and 2000. The redistribution component, that is, changes in the distribution of household consumption would explain only 11 percent of the reduction of poverty in the period.[7] For the most recent period for which there is available data, 2005 to 2010, the Datt and Ravallion decomposition exercise conducted for this poverty assessment also confirms the larger impact of the consumption growth component over redistribution, 77 percent and 27 percent, respectively (table 3). This finding holds for the whole country as well as for urban and rural populations. [8]

Table 3. Growth and Redistribution Components of Poverty Reduction in Tunisia (1980–2010)

	Growth (%)	Redistribution (%)	Actual change in poverty incidence (pp points)
1980–2000			
Urban	87	1	-6.1
Rural	77	23	-19.6
Total	82	11	-15.4
2005–10			
Urban	87	2	-6.4
Rural	73	40	-8.6
Total	77	27	-7.8

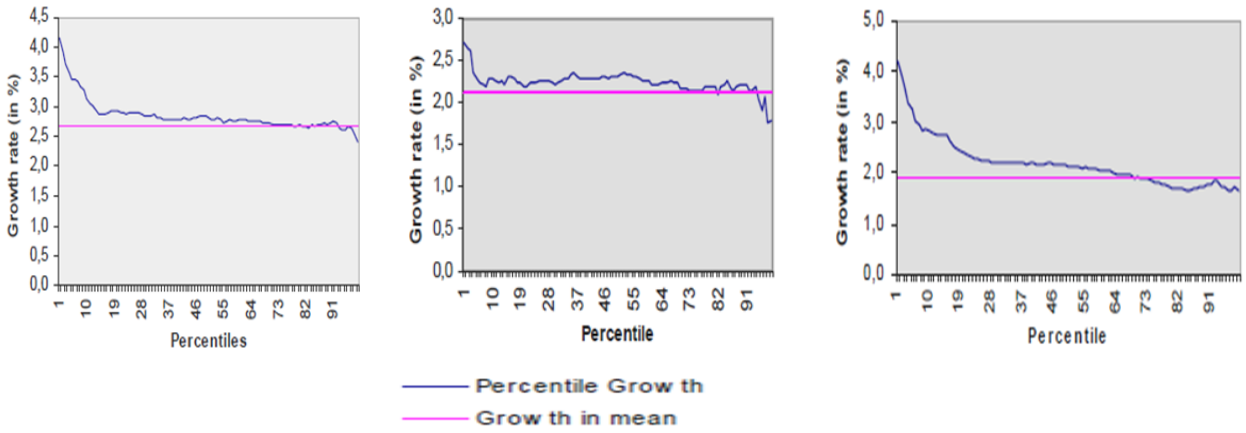
Source: Ayadi et al. (2005) for 1980–2000; World Bank staff estimates for 2005–10, using methodology from Datt and Ravallion (1992).
Note: pp = percentage points.

A second piece of evidence suggests that, despite redistribution only playing a limited role in explaining poverty trends, reductions in consumption inequality took place before the revolution. Growth incidence curves (GICs)[9] for 1980–2000—estimated by Ayadi et al. 2005—show that the consumption growth of the poorest segments of the distribution (percentiles 1st to 15th of the household consumption distribution) was superior to growth among the remaining percentiles (figure 2). Up to the 75th percentile, consumption growth among households was positive. Then, consumption growth for the richer segments hovered around average consumption rate. This finding holds for urban and rural separate distributions, although differences in growth across percentiles narrow down in the case of urban households. This is consistent

[7] The remaining 7 percent of the reduction of poverty incidence is explained by the interaction factor in the methodology of Datt and Ravallion (1992).
[8] Results also confirm that redistribution has played a more substantive role in explaining poverty reduction in rural areas than in urban areas—a contribution that increased in the second half of that decade. In fact—not shown here—there are also marked differences in the contribution of growth and redistribution prior to 2000, and redistribution played a larger role than growth in 1985–90. It was in that five-year period, 1985-90, when economic growth was low; macroeconomic stabilization and structural adjustment programs were implemented; and social assistance gained relevance with the introduction of new programs (Ayadi et al. 2005).
[9] The growth incidence curve is a conceptually useful tool to analyze the impact of aggregate economic growth over a wide range of the distribution that displays the growth rate in income or consumption between two points in time at each percentile of the distribution (World Bank 2015c).

with a larger reduction in inequality among rural than urban households.[10] Ultimately, the GIC analysis shows that some inequality reduction took place along with poverty reduction from 1980 to 2000.

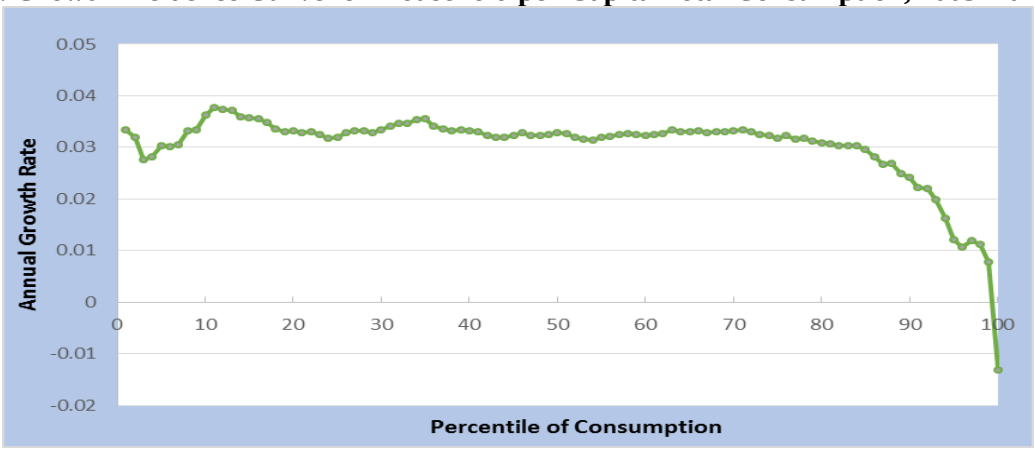
Figure 2. Growth Incidence Curves, 1980–2000



Source: Ayadi et al. (2005) using World Bank methodology to estimate poverty (appendix 1).

An updated GIC analysis for 2005–10 also suggests a pro-poor growth benefiting Tunisian households, although the salience of its inequality reduction appears more limited than it was for 1980–2000 (figure 3). After adjusting for inflation between years and for spatial price differences, consumption growth rates are mostly uniform across the distribution of households. In fact, the poorest 10 percent of the distribution report consumption growth rates below the average. What makes growth pro-poor is that the top 20 percent of the distribution for consumption growth rates are below average, with the richest top 2–3 percent actually experiencing negative growth rates in the period.

Figure 3. Growth Incidence Curve for Household per Capita Total Consumption, 2005–10



Source: World Bank staff's estimates.
Notes: To calculate the GIC, consumption is adjusted to account for regional and intertemporal price differences.

[10] This evidence suggests that growth in Tunisia during 1980–2000 was pro-poor in Kakwani and Pernia's (2000) stricter definition of poverty reduction accruing, from disproportionate growth among the poor compared to the nonpoor.

Estimates of the single most used measurement of inequality, the Gini coefficient, show that consumption inequality among Tunisian individuals declined between 2000 and 2010, although only slightly. Much of the meager decline in Gini coefficients in that decade—down to 32.7 from 34.4—is due to improvements of the distribution between 2005 and 2010 that reversed a slight increase in Gini coefficients observed between 2000 and 2005—a period with lower growth rates than the second half of the decade. Unsurprisingly, the overall decrease of inequality between 2000 and 2010 is half of the 5 percentage point change reported during 1980–2000.[11] Consequently, while consumption inequality trends in the two periods, 1980–2000 and 2000–2010, were both declining, their magnitudes were quite different.[12]

Inequality also declined among regions, although this was not large nor uniform. The only exception is the northeast, which achieved levels of inequality below 0.3 in 2010, after a 21 percent reduction of its Gini coefficient since 2000 (table 3). The center west, southwest, and southeast witnessed much more modest declines in their level of inequality in 2000, while Greater Tunis ended up in 2010 with the same level of inequality measured in 2000, which is explained by an initial increase in inequality in the first five years of that decade, and a reduction in inequality by the same magnitude in the following half of the decade. Within strata, modest reductions in the Gini index were also observed between 2005 and 2010. Large cities went from a Gini of 35 in 2005 to an index of 33 in 2010, small and medium towns declined from 33 to 30, and rural areas also saw a small decline in their Gini index, from 33 to 32.

Table 3. Gini Coefficient, 2000–2010

	Gini 2000	Gini 2005	Gini 2010	Change 2000–2010 (pp)	Share of change due to 2000–2005 (%)	Share of change due to 2005–10 (%)
Total	34.4 (0.060)	34.8 (0.050)	32.7 (0.040)	-1.7	-24	124
Greater Tunis	35.4 (0.012)	37.1 (0.012)	35.4 (0.009)	0	-100	+100
Northeast	33.6 (0.015)	33.4 (0.009)	27.7 (0.008)	-5.9	+3	+97
Northwest	33.5 (0.009)	32.9 (0.010)	33.1 (0.009)	-0.4	+150	-50
Center east	35.1 (0.014)	32.4 (0.008)	31.9 (0.008)	-3.2	+84	+16
Center west	36.8 (0.008)	38.2 (0.011)	34.9 (0.009)	-1.9	-74	+174
Southeast	33.8 (0.013)	37.8 (0.013)	33.1 (0.009)	-0.7	-571	+651
Southwest	34.7 (0.017)	35.6 (0.014)	32.6 (0.017)	-2.1	-43	+143

Source: INS, ADB, and World Bank (2012).
Notes: Gini based in consumption (total expenditure minus expenditure on capital goods). The household consumption to calculate the Gini index at the national level is adjusted for price differences at the stratum level, using the upper threshold for poverty as a price index. Gini coefficients are multiplied by 100 to scale them between 0 and 100.

[11] Gini coefficients 1980–2000 as reported by Ayadi et al. (2005).

	1980	1985	1990	1995	2000
Total	0.455	0.453	0.401	0.417	0.409
Urban	0.418	0.432	0.374	0.389	0.391
Rural	0.412	0.379	0.354	0.353	0.358

[12] In fact, INS, ADB, and World Bank (2012) conclude that although statistically significant, these changes in the distribution observed between 2000 and 2010 are not significant in magnitude. And specific for 2000–2005, the change in Gini is minimal and does not point to economically nor statistically significant changes.

With limited inequality reduction across regions, INS, ADB, and World Bank (2012) show that it is the decrease in *intra*regional inequalities that explains the modest decrease in overall, countrywide inequality during 2000–2010. While *intraregional* Gini fell from 23 in 2000 to 20.1 in 2010, *inter*regional inequalities increased from 11.4 in 2000 to 12.6 in 2010 (table 5). Combining intra- and interregional inequalities in an index of polarization (intraregional Gini over interregional Gini) constructed by INS, ADB, and World Bank (2012), this measure of polarization increased from 49.9 in 2000 to 62.5 in 2010. As noted before for regional poverty and inequality, this increase in polarization was not uniform. Most of the variation took place between 2000 and 2005 and stagnated thereafter.

Table 4. Inter- and Intraregional Inequality in Tunisia

	Gini index		
	2000	2005	2010
General inequality	34.4 (0.48)	34.8 (0.45)	32.7 (0.34)
Interregional inequality	11.4 (0.32)	13.3 (0.29)	12.6 (0.23)
Intraregional inequality	23.0 (0.32)	21.5 (0.29)	20.1 (0.23)
Polarization	49.9 (1.44)	61.9 (1.51)	62.5 (1.27)
Variation of polarization	12.0 (2.11)		0.6 (1.97)

Source: INS, ADB, and World Bank (2012).

Official sources (INS, ADB, and World Bank 2012, 24) have interpreted these results as confirmation that the "identification and alienation problems felt by the citizens of disadvantaged Governorates" intensified during 2000–2010. Whether or not such trends can be associated with identification and alienation may need further analysis, but clearly suggest that standards of living of residents in the same region were converging in the period, while standards of living of residents of different regions diverged. In concrete terms, the estimated annual average growth per capita between 2000 and 2010—in 2005 real prices—for the poorest regions of center west and northwest (2.3 percent and 1.5 percent, respectively) was the lowest of all regions (table 5). Those consumption levels were well behind the consumption of regions with the lowest levels of poverty, Greater Tunis and the northeast, which grew at 2.8 percent and 2.7 percent, respectively, faster than the consumption level of the poorest regions. As a result, the gap in aggregate consumption (in 2005 prices), per capita between Greater Tunis and center west was well known: TD 2,624 compared to TD 1,212 respectively (up from the TD 2000 versus 968 gap in 2000).

Table 5. Aggregate Consumption per Capita by Region, 2005 TD Prices

	2000	2005	2010	Annual average growth (%)
All	1,441	1,696	1,919	2.9
Greater Tunis	2,000	2,331	2,624	2.8
Northeast	1,320	1,547	1,718	2.7
Northwest	1,127	1,292	1,311	1.5
Center east	1,707	1,902	2,189	2.5
Center west	968	1,034	1,212	2.3
Southeast	1,126	1,574	1,787	4.7
Southwest	1,068	1,338	1,507	3.5

Source: INS, ADB, and World Bank (2012).

Over the past decade, increasing gaps in living standards across regions have gone hand-in-hand with stark and increasing regional disparities in poverty, with coastal regions and urban areas being the least affected by poverty. In effect, poverty incidence continues in 2010—as reported in Table 2—to be nearly twice as high in noncommunal areas of Tunisia than in urban areas. For extreme poverty, that gap is even larger—and has worsened in the last 10 years: extreme poverty in communal areas was four times higher in 2000, and seven times higher in 2010, than in cities. Across regions, the overall poverty decline did not benefit the center west and southwest regions, where the disparities with the rest of the country increased during that period. In 2010, poverty rates ranged from a low rate of 8–9 percent in the center east region and Grand Tunis, to a high of 26 and 32 percent in the northwest and center west regions, respectively. Thus, the ratio of high to low regional poverty incidence hovers around 3 to 1 in 2010, while it was around 2 to1 in 2000. Interestingly, the regions with highest poverty incidences, the center west, northwest, southwest and southeast, account for 60 percent of the poor population and 40 percent of the population. In contrast, those regions with lower incidence rates account for 40 percent of the poor population and 60 percent of the total population of the country. Finally, extreme poverty has become more concentrated than before: the poorest regions of the country, namely all the western regions, in 2010 were home to more than 70 percent of the extreme poor, and 55 percent of all poor.

3.3. Recent Evolution of Poverty

4.1 Poverty Projections

There are no official poverty estimates in Tunisia after 2010. The last ENBCV collected, processed, and with results officially released dates back to that year. The new 2015 ENBCV is expected to be completed in 2015 (box 2), with results not released until mid-2016. In the absence of updated evidence, poverty is expected to have increased immediately after the January 2011 revolution, as the economy plunged into recession with a growth rate of -1.9 percent (World Bank 2015a). It becomes harder to predict poverty trends thereafter, as the economy recovered in 2012 with a 3.6 percent growth rate in that year, and then slowed to 2.6 percent in 2013.[13] According to INS official figures, unemployment increased in 2011 to 18 percent, up from 13 percent in 2010. Since then, unemployment has declined to 16.9 percent, 15.8 percent and 15.1 percent,[14] respectively, in 2012, 2013 and 2014, but still above pre-revolution levels. The Consumer Price Index (CPI) has strengthened progressively, going up 3.5 percent, 5.1 percent, 5.8 percent and 4.9 percent, respectively, between 2011 and 2014, and making the satisfaction of basic needs more expensive (Tunisia Central Bank 2015).

These and other developments expectedly influenced post-revolution poverty incidence. Lacking a post revolution ENBCV, the current analysis proposes a methodology that projects post-revolution poverty rates for the first time in Tunisia. The proposed technique includes developments relative to GDP growth, sector composition, unemployment, and CPI as inputs within a partial equilibrium model. Other determinants should be expected to affect poverty, however, but cannot be easily traced back in household surveys; do not change dramatically in the short run; or are hard to measure. For example, changes in human capital accumulation are unlikely to have changed dramatically in a one- or two-year span, for which skill changes are not considered in the analysis. Other factors such as social transfers or

[13] Official figures from INS on GDP growth for 2011 to 2014 are -1.0 percent, 4.5 percent, 2.8 percent and 2.7 percent, respectively (INS 2015b).
[14] Figures reported online by INS accessed on July 28, 2015 at http://www.ins.tn/indexfr.php. Estimates for 2014 include only three quarters—the second quarter was not reported.

subsidies cannot be traced back in the household survey with precision (see chapter 8) to improve the accuracy of projections.

For those changes considered in the exercise—GDP, unemployment, and CPI—the proposed analysis imputes the observed changes in those variables in 2011 and 2012 back into the original distribution of households' consumption obtained from ENCBV 2010. So the distributions of consumption for 2011 and 2012 result from "shocking" the observed consumption distribution in 2010 with the changes in GDP, unemployment, and CPI observed in 2011 and 2012. Those resulting distributions of consumption post-revolution are then used to estimate the proportion of households under CPI-updated poverty lines for the years 2011 and 2012, respectively. This simple methodology projects poverty rates for such years.

Box 2. Latest Available Information to Project Poverty Estimates

The proposed projection exercise can be implemented to the extent to which updated information is available. At a minimum, the analysis would benefit from a combination of micro- and macrolevel information on households' consumption, GDP, sector value added, inflation, and unemployment. The most updated microlevel information available refers to 2010, which is taken as reference year upon which projections are estimated for successive years. The next ENBCV is being collected in 2015—fieldwork collection expected to be finalized by May 2016. It is expected that INS will release its first results from the survey by end-2016 (after definitive results of 2014 census are made public, by December 2015 or early 2016). However, it is unknown when survey data files will be made accessible to the public for independent analysis.

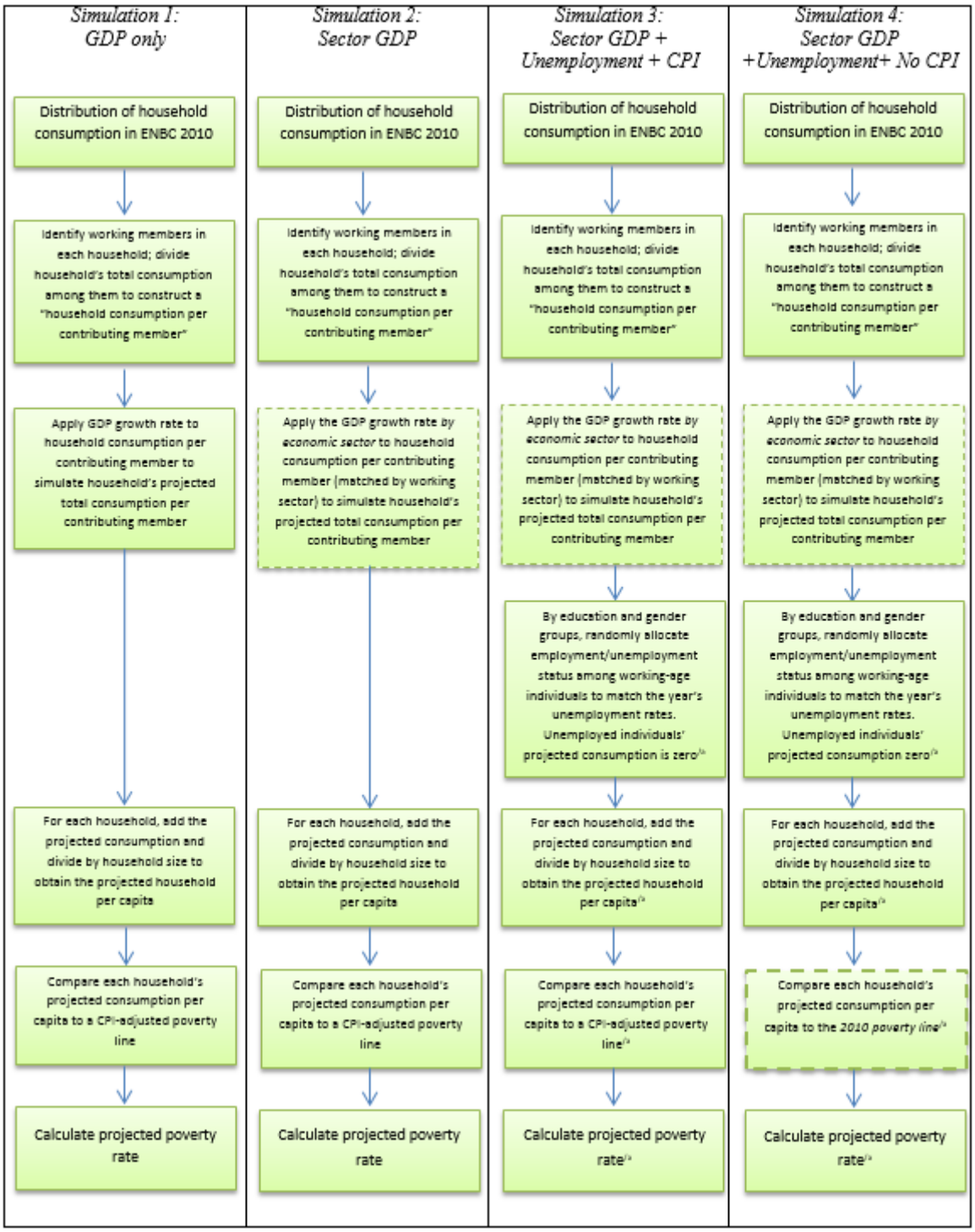
Regarding macro data, the latest available GDP growth figures as reported by INS refer to the first quarter of 2015. Aggregated unemployment rates, however, refer to 2014, but their disaggregation by socioeconomic groups—education-related groups—is only available for 2012. There is disaggregated information on education more updated than 2012, in fact to up the first quarter of 2015, but it only refers to tertiary education graduates so it cannot be used for projection purposes. In effect, this implies that the most recent year for which a human capital–based disaggregation of unemployment can be made is 2012. Interestingly, disaggregation of unemployment by age groups and gender is also available (up to 2014), but these disaggregations are kept independent from each other and it is not possible to cross these two dimensions. This is to say that a multidimensional disaggregation of unemployment by education, age, and gender simultaneously is not possible with the information currently available post-2010.

For the cross-survey imputation exercise explained in section 4.2, the proposed methodology to impute a consumption distribution from the ENCBV and ENPE can be updated to the extent that ENPEs are available. As already indicated, the latest ENCVB available is for 2010, and they are collected every five years. ENPEs, however, are annual surveys. The latest ENPE collected is 2013, but their data files have not been made available for analysis. The latest year for which both individuals and households data files are available for analysis is 2012. For the purpose of independent analysis, it is worth noting that between 2005 and 2013, INS has made available both individual and household data files only for 2009 and 2012 (INS 2015).

Finally, the World Bank is currently working on developing and improving a new projection methodology for countries across the world that would make simultaneous macroeconomic and poverty projections every year (the so called Macro Poverty projection notes). These projections will be based on several methodologies, including historical elasticities between GDP and poverty trends that can be either distribution neutral or distribution sensitive.

In its simplest version of the projection exercise, **simulation 1 (GDP only)**, the GDP growth observed in 2009, 2011, and 2012 are successively imputed to each household in the 2010 ENBCV. Figure 4 presents the steps to construct this simulation scenario. Under simulation 1, per worker consumption of each household is adjusted by the officially reported GDP growth for the projected years. The underlying assumption is that there is a perfect pass through between income and consumption growth in any given year. The poverty line is then adjusted based on each year's CPI, as reported by the INS. The resulting new distribution of consumption is compared with the updated poverty line, and those households below the new poverty line are classified as poor.

Figure 4. Diagrammatic Representation of Poverty Simulations



Source: World Bank staff.
a. These steps are bootstrapped 100 times account for the random allocation process of employment status.

A first alternative projection scenario includes sector-specific GDP growth. Under **simulation 2 (sector GDP)**, the mechanics of simulation 1 are repeated, but now workers in each of the three broad sectors of the economy (agriculture, manufactures, and services) are imputed their sector-specific growth rate. The main assumption in this simulation is that sector-specific growth rates are a good approximation for describing the growth experienced across all activities comprising the three sectors of the economy, thus averaging out any heterogeneity that takes place across activities within each sector.

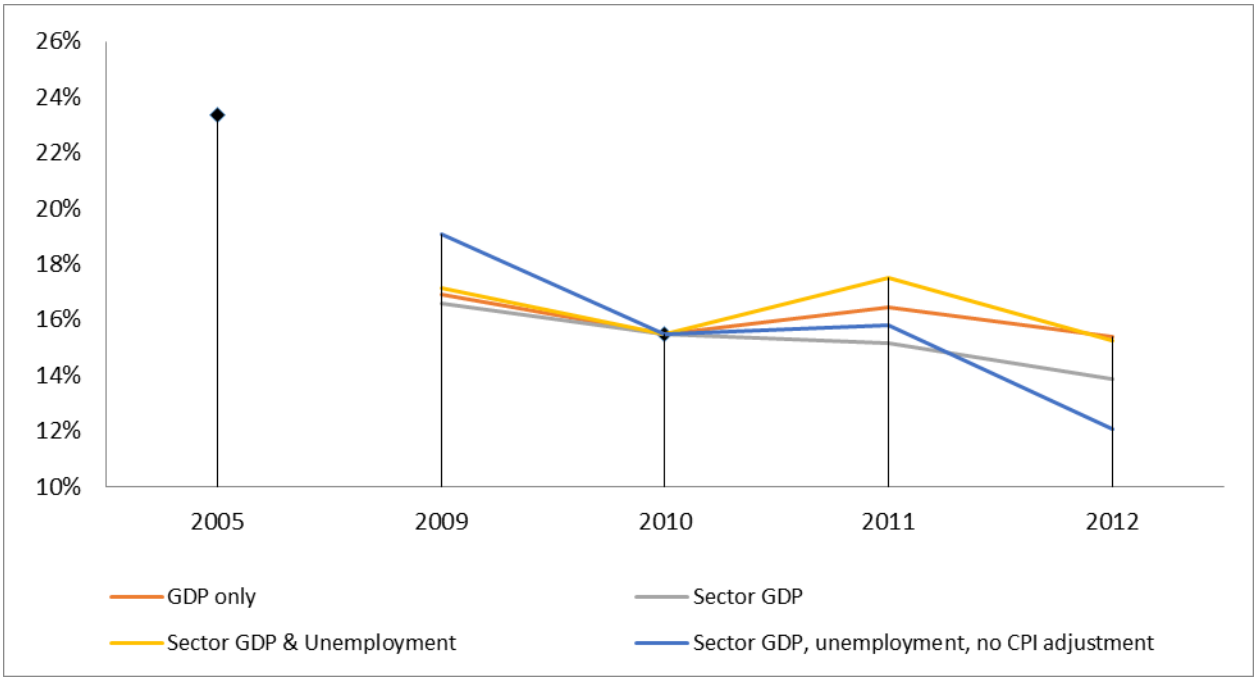
A third and more sophisticated projection, **simulation 3 (sector GDP, unemployment, and CPI)** explicitly includes the observed unemployment rates in 2011 and 2012. In Tunisia, official data on unemployment rates is disaggregated by educational level (that is, unable to read, individuals with primary education, secondary education, and tertiary education). Unfortunately, INS reports disaggregate unemployment rates for 2011 and 2012, but not for 2013 or 2014, for which projections in this scenario (and the rest for comparability) are limited to 2011 and 2012 (box 3 earlier). Also, unemployment rates by education level could not be further disaggregated by age and gender, which would have provided a higher-resolution simulation. The annual changes in unemployment observed in each year are imputed back randomly across the distribution of households in ENBCV 2010. Individuals who are assigned unemployment status in the simulation are imputed no consumption per capita from labor. Finally, annual poverty lines are adjusted for inflation using the national CPI to reflect the increasing cost of living. This simulation procedure is replicated 100 times and a projected poverty rate is obtained from the average poverty rate of all replications.

A final projection, **simulation 4 (sector GDP, unemployment, and no CPI adjustment)** is conducted to better understand the effect that poverty line adjustments have on projected poverty estimates. This simulation allows to differentiate the effects on poverty accruing from socioeconomic developments from those resulting from methodological issues (that is, the adjusting of the poverty line). This simulation simply replicates simulation 3, except for the CPI adjustment of poverty lines. Instead, the original poverty line in 2010 –without further adjustment based on CPI–is used to determine whether or not a household in 2011 and 2012 is poor, after sector-specific growth and unemployment rates are imputed. Once again, the allocation of observed sector GDP growth and unemployment rates into 2010 ENCBV households is replicated 100 times and all of these poverty rates are averaged out to report the final poverty projection for this scenario.

Table 7 and Figure 5 present the average point estimates of poverty incidence under the four projection scenarios. **The estimates indicate, first, that poverty rates increased in 2011 and decreased in 2012. According to these results, the poverty impact of the revolution oscillates between 0.9 and 2.2 percentage points, depending on which of the four simulations is considered**. When the effect of specific-sector GDP and unemployment are included (simulation 3), the impact is largest with 2.2 percentage points. If, simplistically, only GDP growth is considered (simulation 1), the effect is the smallest, with a 0.9 percentage point increase in poverty incidence.

Second, the recovery in 2012 was enough to reverse the increased poverty observed in 2011. Had it not been for the observed increase in prices (as reported in simulation 4), the economic recovery of that year would have brought poverty levels below those observed in 2010. **It is indeed the increasing cost of basic needs that counteracted to some extent the positive impact on poverty of (sector-specific) GDP growth and reduction in unemployment observed in 2012.** All things considered, sector growth, unemployment and CPI, poverty rates in 2012 were similar to those observed pre-revolution.

Figure 5. Projected Post-Revolution Poverty Rates in Tunisia



Source: World Bank staff's estimates based on ENCBV 2005 and 2010, and INS official data on growth, unemployment, and CPI.

Table 7. Projected Poverty Rates, 2011–12

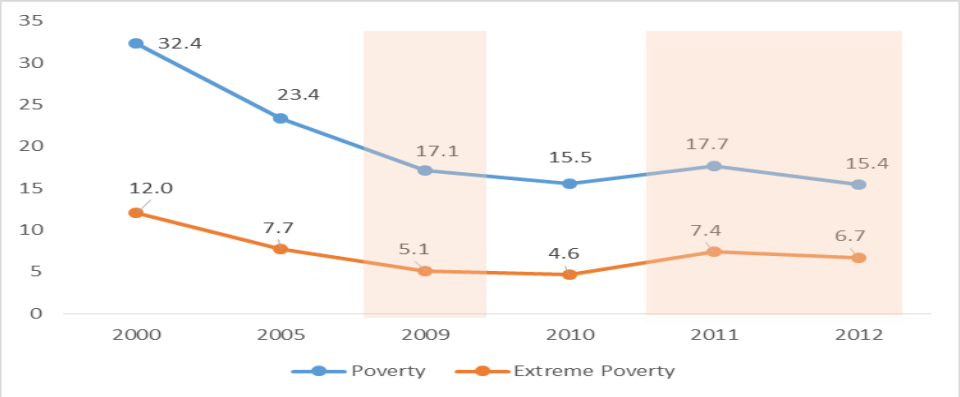
	Official (baseline, %)	Simulation 1: GDP only (%)	Simulation 2: Sector GDP (%)	Simulation 3: Sector GDP and unemployment (%)	Simulation 4: Sector GDP, unemployment, and no adjustment for CPI (%)
2005	23.4				
2009		16.9	16.6	17.1 (0.16)	19.1 (0.16)
2010	15.5	15.5	15.5	15.5	15.5
2011		16.4	15.2	17.5 (0.37)	15.8 (0.37)
2012		15.4	13.9	15.2 (0.26)	12.1 (0.25)

Source: Authors' estimates based on ENBCV 2005 and 2010, and INS official data on growth, unemployment, and CPI.

Figure 6 reports additional estimates for extreme poverty and compares them with the official and projected poverty rates pre- and post-revolution. Poverty estimates reported in figure 6 are based on scenario 3 projections that include GDP, unemployment, and CPI changes over time. **Projected extreme poverty trends show similar results to those reported for poverty**: **a sizable increase in 2011 and a notable decrease in 2012.** However, in contrast to poverty trends, the reduction in extreme poverty in 2012 is not sufficient to fully revert increases observed in 2011. This is because of the larger impact that unemployment had on extreme poverty than on poverty in 2011 (and the more limited impact of the employment recovery in 2012 on the larger pool of extreme poor in 2011).

It should be noted that these projected rates are likely an upper bound of the true poverty variation that took place in those years. This is because the effects of consumption subsidies, social transfers, remittances and private transfers, and labor coping strategies (increasing work supply, changing labor status, for example) are not considered in these projections. To the extent that coping strategies were adopted by households and/or government initiated compensation interventions, estimates failing to include them might overestimate poverty impacts.

Figure 6. Official and Projected Poverty Rates: Poverty and Extreme Poverty Trends, 2000–2012



Source: World Bank staff's calculations using ENBCV data and INS estimates of growth, unemployment, and CPI (simulation 3).
Note: Shadowed areas indicate Bank's estimated rates. Nonshadowed rates are official estimates.

4.2 Survey-to-Survey Imputation

New survey-to-survey imputation techniques, only recently developed, can help overcome the lack of frequent budgetary surveys from which directly estimate poverty incidence. In a nutshell, survey-to-survey imputation techniques consist in developing a consumption (or income) model from household expenditure (income) surveys that can be used to impute a distribution of consumption (income) among households in another survey—labor force, for example—in the same or a different year. Early foundations of this technique stem from the "poverty-mapping" approach by Elbers, Lanjouw, and Lanjouw (2003), which predicted consumption data into the census from a consumption model estimated in a previous household survey. More recent applications of this technique have imputed consumption between household surveys and DHSs—as in Stifel and Christiaensen (2007), Ferreira et al. (2011), Christiaensen et al. (2012), and Mathiassen (2013).[15] Closer to the Tunisian case, Mathiassen (2009) in Mozambique, Douidich et al. (2013) in Morocco, and Newhouse et al. (2014) in Sri Lanka have imputed consumption from a household expenditure survey into a more recent ENPE and subsequently estimated poverty rates.

In Tunisia, as elsewhere, survey-to-survey imputation estimates a consumption model in one survey (call it "survey A"), and then uses its parameters to impute consumption in another survey (call it "survey B"). Box 3 outlines the consumption model used in Tunisia for this cross-survey imputation exercise. Critically, all variables included in the model estimated in survey A must also be available in survey B to ensure that observed and imputed poverty rates are comparable. This means that variables that potentially could be relevant in explaining consumption in survey A, but are not present in survey B, will not be included in the consumption model. Also, differences in the definition of the same variable in the two

[15] Tarozzi (2007) imputes consumption using the same type of survey, a budgetary survey, over time.

surveys (for example, in the case of Tunisia, the definition of urban areas) may have consequences in the replicability of the model. Furthermore, differences in sampling design of the surveys involved in the imputation may also have consequences in the quality of the estimates (Newhouse et al. 2014).

Consumption models used in cross-survey imputation typically have limitations in their prediction capacity, thus they are unable to account for all of the consumer's behavior. A strategy developed to account for consumption behavior not captured directly in the consumption model consists of imputing the estimated residuals of the consumption model in survey A[16] into survey B (see, for example, Ferreira et al. [2011] and Douidich et al. [2013]). These analyses impute the "average residual" of households pertaining to each decile of a distribution of wealth in survey A into the households pertaining to the respective wealth deciles defined by the same set of assets in survey B.[17] This strategy is believed to be more precise than a random inclusion of residuals as it minimizes the chance that residuals obtained in households of low socioeconomic status in survey A may end up allocated to a household of a very different socioeconomic extraction in survey B.

Dang, Lanjouw, and Serajuddin (2014) provide an alternative to decile-based residual imputation. Their approach estimates a clustered random effects consumption model using survey A information. Next, it applies the estimated coefficients from that regression in survey A to individuals in survey B to obtain a predicted consumption. Finally, they randomly allocate both the clustered random effects and error terms of the regression in survey A to each individual in survey B. This process is bootstrapped and the projected poverty rate is obtained from the average of all repetitions. By separating two sources of error terms—one related to imputation-specific limitations and the other to design limitations—their estimates can potentially control better for survey data and design limitations, thus estimating more precisely the standard errors of imputed consumption estimates.

Box 3. Modeling Consumption using Data from Tunisia's ENCBV and ENPE

The survey-to-survey imputation analysis is based on data from the 2010 round of the ENBCV. Information at the household and individual levels was used to estimate an ordinary least square (OLS) household consumption model. In particular, the variables used as regressors in the model are the following:

- **Sociodemographic variables**: Household size and its square; dependency rate; household head characteristics such as age in logarithm form and its square, gender, and marital status; education (primary, secondary, or university as highest level attended); and education of members of the household other than its head;
- **Labor characteristics**: Employment status (unemployed or otherwise); sector of work (agriculture or otherwise) of the household head and other members of the household;
- **Access to basic services**: Such as tap water and electricity;
- **Asset/durables ownership**: Car, motorcycle, and/or bicycle; television and/or radio; washing machine, refrigerator, freezer, dishwasher, or oven;[a] and
- **Location variables**: Rural areas and regional controls.

The dependent variable of the model is the logarithm of annual household consumption per capita. Household consumption includes monetary expenditures for the consumption of food and non-food items (clothing, hygiene

[16] These estimate residuals capture the difference between each individual or household's observed consumption and its predicted consumption by the model used in survey A.

[17] In Ferreira et al. (2011), deciles are defined over the first principal component of an index composed of household ownership of durable goods (such as refrigerators, televisions, cars, computers, and so forth), on housing characteristics (such as the type of roof materials and floor cover), and on access to utilities (such as water and sanitation). Obviously, it is essential that wealth deciles must be defined in each survey according to the same set of assets, for which these assets must be both present and identically defined in each of the surveys used in the cross-survey imputation.

and care, leisure); housing investment expenditures; expenditures on transport; own consumption of food; gifts in kind and in-kind benefits received; imputed rent of owner-occupied household or household which enjoys free housing. Consumption does not include capital expenditures, durable goods expenditures, or exceptional ceremony expenditures (INS et al, 2012). Household consumption was divided by the number of household members to obtain a per capita measure without accounting for any age or gender based scaling.

Additional information on type of employment (self-employed, salaried worker, private or public employment) was available in the ENBCV 2010, but absent in the 2009 round of the Labor Force Survey and thus discarded from the final estimations. In contrast, ownership of assets and dwelling characteristics is widely available in the ENBCV 2010. This information is not incorporated into the model, but used to calculate a wealth index for the imputation of errors following Ferreira et al. (2011)'s imputation approach.

Before applying the cross-survey imputation, it was confirmed that the common variables in both the ENBCV and ENPE surveys were consistent in terms of their definitions. Sample design was also comparable, both consistent with the 2004 census. The ENBCV 2010 contains information on 11,281 households across seven regions, while the sampling frame was stratified by the governorate and living area (large cities, medium and small towns, and noncommunal areas). Surveys used are only one and two years apart, imputing consumption from the ENBCV 2010 into ENPE 2009 and ENPE 2012. Underlying the imputation exercise, it is assumed that the consumption model in 2010 is appropriate to explain consumption in 2012. The short period of time, two years, between imputations support this assumption, but the fact that a revolution took place between both years may question the validity of this assumption. In fact, abrupt changes in the returns to poverty determinants will not be captured by the cross-survey imputation. While this is a cause of concern, it is believed that changes in returns might have been more likely a challenge for imputation in 2011 than in 2012. This is the case because the largest economic changes following the revolution—in terms of GDP and unemployment—took place in 2011, while they returned to pre-revolution levels in 2012. Hence, the comparability of returns between 2010 and 2012 should arguably be a closer fit than returns in 2010 and 2011.

Source: World Bank staff.
a. This final list is the result of an iterative process where additional variables (for example, referring to durable ownership and access to basic services) and alternative specifications of the variables (for example, regarding different groupings of educational attainment) were tried in search of a robust model maximizing statistical performance (that is, statistical representativeness of variables and explanatory power).

The incipient empirical body of work on cross-survey imputation has not yet concluded which of the alternative methods is superior and under what circumstances. Issues such as simplicity of the approach, comparability of surveys, treatment of residuals, consumption modeling, and data quality and accessibility, among others, should all play a role in the selection of the most appropriate imputation methodology. Rather than choosing a single cross-survey imputation approach among the presented alternatives, the current analysis produces multiple survey-to-survey imputation sets of results using all the described approaches.

First, residuals from survey A are randomly allocated to survey B, regardless of the characteristics and location of the households in each survey. Results under this method are reported under the scenario called "random residuals imputation." Second, following Ferreira, Gignoux, and Aran (2011) method, residuals from survey A are more precisely imputed in survey B by randomly allocating residuals within predefined groups in both surveys. As reported above, Ferreira, Gignoux, and Aran (2011) use deciles of a generated wealth index (and defined by ownership of durable goods, housing characteristics, and access to utilities) to allocate residuals between surveys.[18] It is only possible to conduct this allocation of

[18] Thus, from a set of commonly available assets in survey A and B, an index is calculated from factor decomposition analysis. From the resulting index, asset-based deciles are estimated. The distribution of residuals

residuals among surveys when the same assets can be identified in both surveys. This method produces estimates of poverty under the scenario called "wealth index deciles imputation." An extension of this methodology is also attempted by further dividing asset-based deciles by urban and rural populations, effectively separating deciles of wealth between urban and rural households. This is captured in the scenario "wealth index deciles and urban-rural imputation." A final method follows the Dang, Lanjouw, and Serajuddin (2014) survey-to-survey imputation method described above, consisting of imputing cluster random effects and errors across surveys. Results are presented under the scenario described as "DLS imputation."

Data availability determines the actual application of these alternative methods to the Tunisian context. In the case of Tunisia, ENBCV 2010 constitutes "survey A," that is, the most recent survey from which official poverty incidence is estimated from households' consumption. ENPEs constitute "survey B." They have been collected every year since 2005. However, INS has only made available the entire ENPE 2009, 2010, and 2012. So, for the purpose of this exercise, the different imputation methods are applied to those surveys. The definitions of all variables of the consumption model are confirmed to be comparable. This turns out to be the case for the 2010 and 2012 ENPEs, but not for the 2009 ENPE. In that year, the ENPE did not include the occupation of individuals. This means that the full consumption model estimated in the ENBCV 2010 cannot be replicated in 2009. Two options are presented to overcome this problem. One is to retain the preferred model for 2010, the "full model," and apply it only to ENPE 2012. A second option is to find a model that is truly comparable for all years, which implies simplifying the full model by not including number of children in the household and household head and members' labor occupation. This model, "comparable model," is applied to both the ENPE 2009 and 2012. Figure 6 describes step by step each the simulation mechanics under each simulation scenario.

The use of this rich array of methods—four residual imputation techniques and two full and comparable consumption models—provides a wide range of poverty estimates from survey-to-survey imputation that take into account best international practices while customizing their application to the specific circumstances of Tunisia. At the same time, those sets of results also underscore the limitations of imputed poverty estimates, which are proportional to the capacity of the consumption model to reproduce observed poverty estimates. In the case of Tunisia, table 8 shows that the estimated consumption model provides a reasonable approximation to the observed poverty rates in 2010 (see also appendix 2). Looking at the first column, "ENBCV 2010 predicted," the consumption model estimated in ENBCV 2010 yields a national poverty estimate of 16.8 percent using the random residuals method—compared to the observed official poverty rate of 15.5 percent. Poverty estimates using wealth deciles for imputing residuals predict a rate of 17.8 percent—and only a slightly lower poverty estimate of 17.6 percent when urban and rural populations are separated. Using models that are comparable for all years confirms the results obtained from the full model. Estimates under the comparable model suggest that the Dang, Lanjouw, and Serajuddin (2014) method of imputation, with a predicted rate of 16.1 percent, provides a closer estimate of poverty to the official rate in 2010.

When consumption models from the ENBCV 2010 are imputed into the 2010 ENPE (table 8, column "ENPE 2010 predicted"), results from the different methods all show lower poverty rates than the officially reported numbers. Imputed poverty incidence ranges from 14.3 percent to 14.6 percent of the national population. In other words, the *predicted* poverty rate—resulting from consumption models—within the 2010 ENBCV *overestimates* the true or observed poverty rate of 15.5 percent, while the predicted poverty rate within the 2010 ENPE *underestimates* the true poverty rate in that year.

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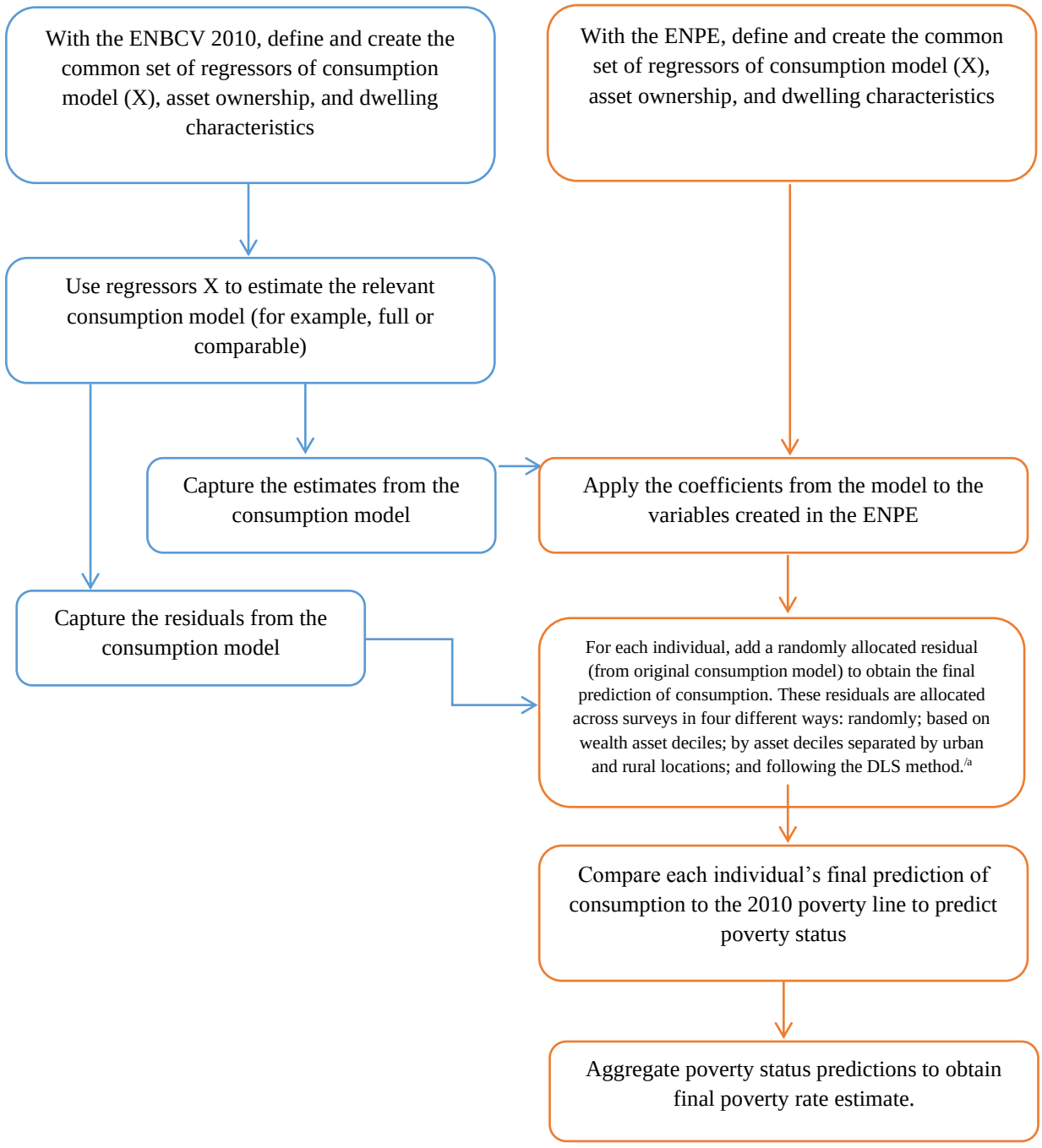
specific to each decile from survey A are then imputed into survey B according to constructed deciles based on the same asset-based index.

Figure 7. Major Phases of Survey-to-Survey Imputation



Source: World Bank staff.
a. This step (along with subsequent steps) is typically boostrapped. DLS model refers to the Dang, Lanjouw, and Serajuddin (2014) cluster random effects model that includes asset ownership and dwelling characteristics.

With these results in mind, poverty estimates for 2012 resulting from survey-to-survey imputation into that year's ENPE (table 8, column "ENPE 2012 predicted") are found **significantly lower than poverty incidence estimates for 2010**. This result is robust to the method used—full or comparable—and the way residuals are allocated—random, by decile, and by urban/rural location. Interestingly, the decrease in

poverty rates across methods suggests a range between 1.1 and 2.2 percentage points, when comparing ENPE 2010 and ENPE 2012 distributions, reassuringly close to those reported for 2012 following the projection methodology presented in the previous section: a reduction in poverty ranging between 1 and 2.3 percentage points.

Results also suggest that much of the change in poverty between 2010 and 2012 typically came from reductions across urban households, with more modest decreases in rural poverty. Comparing the predicted poverty rates in ENPE 2010 and ENPE 2012 suggests that the method of random allocation of residuals renders the largest reductions in poverty, both in urban and rural areas. The other methodologies, allocating residuals based on assets ownership and urban/rural location and DLS, show much more modest decreases in poverty than the random allocation. A simple decomposition exercise—not shown here—indicates that the contribution of urban poverty changes to national poverty reduction between 2010 and 2012—comparing ENPE 2010 and ENPE 2012 predictions—lies between 65 percent and 90 percent of the total change, depending on the simulation method used.

Table 6. Survey-to-Survey Imputation of Consumption-Based Poverty in Tunisia

Consumption model	Survey-to-survey method	ENBCV 2010 (predicted)	ENPE 2009 (predicted)			ENPE 2010 (predicted)			ENPE 2012 (predicted)		
		National	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
Full model: Comparable to ENPE 2010, 2012	Random residuals	16.8 (0.34)				14.5 (0.10)	12.2 (0.13)	18.8 (0.17)	12.3 (0.11)	10.1 (0.13)	16.9 (0.2)
	Wealth decile	17.8 (0.34)				14.6 (0.09)	9.9 (0.12)	23.3 (0.18)	13.1 (0.09)	8.7 (0.12)	22.4 (0.22)
	Wealth decile, u/r	17.6 (0.33)				14.5 (0.1)	12.1 (0.12)	18.9 (0.17)	12.9 (0.09)	10.3 (0.12)	18.5 (0.17)
Comparable model: Comparable to ENPE 2009, 2010, 2012	Random residuals	16.8 (0.34)	15.0 (0.09)	11.9 (0.12)	21.0 (0.16)	14.5 (0.11)	12.2 (0.13)	18.7 (0.2)	12.7 (0.09)	10.4 (0.11)	17.7 (0.18)
	Wealth decile	17.7 (0.36)	15.5 (0.09)	9.7 (0.1)	26.8 (0.17)	14.5 (0.1)	9.5 (0.12)	23.6 (0.21)	13.4 (0.09)	8.6 (0.12)	23.5 (0.22)
	DLS residuals	16.1 (0.41)	15.4 (0.01)	12.1 (0.01)	21.8 (0.02)	14.3 (0.01)	11.7 (0.01)	19.2 (0.02)	12.5 (0.01)	9.8 (0.01)	18.2 (0.02)

Source: World Bank staff's calculations using ENBCV and ENPE data.
Notes: Official poverty rate for 2010 was 15.5. The point estimates are obtained from the average estimates from 100 bootstrap simulations. The corresponding standard deviations are shown in parenthesis.

Chapter 3. Who Are the Poor and the Bottom 40 Percent?

3.1. Poverty Profiles

The analysis of poverty and inequality thus far has focused on individuals, households, and regions. Another dimension requiring analysis is population groups, which are typically studied using poverty profiles, by looking at the levels and differentials in poverty incidence across population groups defined by some features or attributes (education level, household composition, occupation and residence, to cite a few). In this respect, previous poverty analyses—World Bank (1995a, 2000, 2004), Ayadi et al. (2005), Bechir (2011)—have all emphasized that, both in rural and urban areas, poor households tended to be larger in size; have a large proportion of children and a high dependency ratio; and are headed by adult breadwinners. The poor disproportionally belonged to households whose breadwinner had no formal education. School enrollment rates were lower for the poor. In *rural areas*, most poor household heads had lower educational attainment, were wage earners, and many also owned land and livestock.[19] Poor rural households that were engaged in production activities typically had access to land, but their landholdings were small (averaging 2 hectares [ha]), rarely irrigated and often exhibited low productivity (especially in rain-fed areas). The incidence of rural poverty was highest among households whose head was employed in construction, followed by services and agriculture. In *urban areas*, more than 60 percent of the poor earned their living as wage earners, many in low-skill occupations, followed by self-employment in non-agricultural activities. They faced scarce job prospects because employment opportunities had been shifting toward jobs requiring higher skills, while—owing to high dropout rates from the primary school system—the ranks of the unskilled working-age population had grown. By occupation of the household head, the highest incidence of urban poverty was in construction.

A fairly high proportion of people remained clustered above, but close to the poverty lines. Forty percent of the rural population and 15 percent of urban residents had consumption levels that were inferior to double the lower poverty line. These are sizable shares of the population in a country exposed to various risks (for instance, droughts) and external shocks (related to tourism, exports and, more recently, terrorism). Interestingly, two other aspects of the poverty situation in 2000 caused concern in Tunisia (World Bank 2004). One was the appearance of poverty in periurban areas and the inability of a large number of young graduates to secure jobs. The second is an increase in vulnerability, as measured by the number of people having expenditures less than 30 percent above the poverty line. Thus defined, the share of vulnerable people within the total population rose from 14 percent in 1990 to 17 percent in 1995 (from 1.1 million to 1.5 million people).[20]

More recent analyses covering 2000–2010 (INS, ADB, World Bank 2012) emphasize, in addition to the location of the household, the labor status of the household head and his or her educational level. As table 6 shows, unemployment is reported as a major cause of poverty. The unemployed represent the largest contributor to poverty across all professional categories. The most affected households are also those whose head is a farm worker, followed by those headed by a nonfarm worker or a farm operator. Professionals and the self-employed are virtually free from poverty. By education level, as attainment increases, the likelihood of being poor significantly diminishes. About 90 percent of all the poor are concentrated in households headed by individuals with either no education, or primary education as highest level (table 6).

Table 7. Incidence and Contribution to Poverty in 2010

[19] The rural poor derived their incomes primarily from agricultural activities (own-farm activities and agricultural wage labor), but often also earned income outside agriculture. The need to diversify their sources of income stemmed in part from the inability of small farms to provide a full-time occupation, and in part from the variability of agricultural incomes because of fluctuations in rainfall.

[20] Chapter 5 discusses vulnerability in Tunisia in further detail.

	Incidence of poverty (%)	Share of population in that group (%)	Relative contribution to poverty (%)
Education			
No education	23.4 (1.1)	28.8 (0.6)	45.3 (1.6)
Primary	18.1 (0.9)	38.0 (0.6)	44.4 (1.5)
Secondary	7.2 (0.6)	25.5 (0.6)	11.9 (0.9)
Higher	0.4 (0.2)	7.7 (0.4)	0.2 (0.1)
Total contribution (within education categories)	***15.5***	***100***	***100***
Profession			
Senior executives and liberal professionals	0.7 (0.3)	5.1 (0.3)	0.2 (0.1)
Mid-level executives and liberal professionals	3.6 (1.0)	4.4 (0.2)	1.0 (0.3)
Other employees	8.4 (1.2)	8.5 (0.3)	4.6 (0.6)
Managers of small trades in industry, commerce, and services	7.4 (1.1)	8.2 (0.3)	3.9 (0.6)
Craft persons and self-employed in industry, commerce, and services	10.8 (1.9)	2.9 (0.2)	2.0 (0.4)
Nonfarm workers	24.2 (1.1)	29.4 (0.6)	45.9 (1.6)
Farm operators	20.0 (1.7)	9.5 (0.4)	12.3 (1.1)
Farm workers	28.9 (4.3)	1.9 (0.2)	3.5 (0.6)
Unemployed	40.3 (4.2)	2.0 (0.2)	5.1 (0.7)
Pensioners	5.8 (0.7)	15.7 (0.5)	5.9 (0.7)
Other nonworking persons	15.2 (1.3)	8.8 (0.3)	8.7 (0.8)
Off household support	28.9 (3.0)	3.7 (0.3)	6.9 (0.9)
Total contribution (within profession categories)	*15.5*	*100*	*100*

Source: INS, ADB, and World Bank (2012).
Note: This table uses upper threshold.

3.2. A More Updated and Extensive Poverty Profile in Tunisia

Official poverty profiles in Tunisia have typically been focused on a few characteristics. This is the case of the latest INS, ADB, and World Bank (2012) profile, which relates poverty incidence with geographical location, educational levels (of household head), and occupations (of household heads). Section 2.4 summarized the key results of that recent official profile. This study argues that its focus has been narrow, and there is still a lot of ground to explore in Tunisia's poverty profiling. In particular, it is possible to:

(i) provide a more comprehensive and systematic profiling of poverty for 2005 and 2010 that includes additional sociodemographics, asset ownership, and access to basic services;
(ii) expand that analysis to 2012; and
(iii) include the bottom 40 percent of the population.

This chapter reports the key findings of expanding the official profile exercise. It profiles the characteristics of the poor (P), the bottom 40 percent (b40), and the nonpoor (NP) in Tunisia and then compares the profiles for 2005, 2010, and 2012. Profiled characteristics include sociodemographic and location features; labor conditions; asset ownership; and access to basic services. Statistical means tests are conducted to assess the differences of observed characteristics across profiles, both within and between years. Notwithstanding these improvements, multiple gaps remain, even after those extensions. This is a result of absent data (for example, there are no household expenditure or ENPEs after 2013), limited access to existing data (for example, access to the ENPE 2012 data is only incomplete), and methodological limitations (that prevent, for example, a full comparison of educational attainment across surveys due to discrepancies in definitions). These issues are all discussed below.

3.3. The 2005 and 2010 Profiles Revisited

Pre-revolution poverty profiles in Tunisia show few surprises with respect to their correlates. Looking at the 2005 and 2010 profiles obtained from ENCBVs suggests that profiles among the poor and nonpoor converge only in a few dimensions in both years.[21] Both population groups live mostly in households headed by males (close to 90 percent in both years) aged 40–64 years (two-thirds for both the poor and the nonpoor). Dependency rates are low both for the poor and nonpoor, 0.43 and 0.33, respectively, in 2010—with similar rates observed in 2005.

Beyond these similarities, the poor live in more crowded households: they have more than one additional member and about 50 percent fewer rooms per capita than nonpoor households. The poor are concentrated in western regions (about 55 percent of the poor reside in those regions, despite representing only 30 percent of the total population), with less educated members in poor households than among nonpoor households (figure 7). Adding the southeast region to western regions, about 65 percent of the poor live in these interior regions (60 percent in 2005). Among the nonpoor, the situation reverses: 65 percent live in the coastal regions of Grand Tunis, northeast and center east, while the remaining 35 percent live in interior regions. Poor households are equally concentrated in urban and rural locations, 50 percent of poor households in each area in 2010. In 2005, some 53 percent of the poor lived in urban households. Among nonpoor households, the situation is different: 69 percent live in urban areas and 31 percent in rural areas (both in 2005 and 2010).

Other stark differences between the poor and nonpoor exist in education attainment (figure 8). Forty-three percent of poor households in 2010 were headed by individuals with no education, compared to 26

[21] See appendix 3 for statistical mean tests across socioeconomic groups.

percent among nonpoor households (43 percent and 31 percent, respectively in 2005). Less than 12 percent of poor households are headed with someone who attended at least secondary or higher education in 2010, compared to 37 percent of nonpoor households. Not shown in table 8, a substantial gap also exists when looking at the education of household members other than the head. Only about 10 percent of poor households have at least one member who attended tertiary education, whereas about 30 percent of nonpoor households have at least one educated member in 2010. **Having higher levels of education does not prevent a household from escaping poverty, but it is clearly correlated with higher living conditions (that is being a nonpoor household).**

Poor households are less likely to be headed by someone out of the labor force than the nonpoor (24 percent and 31 percent, respectively, in 2010) but are more likely to be unemployed (5 percent) than the nonpoor (1.5 percent). Nonpoor household heads are twice as likely to have a salaried job in the public sector than poor household heads. Yet their relative shares are rather low: only 15 percent of nonpoor household heads have such coveted jobs, compared with 7 percent among the poor in 2010 (19 percent and 9 percent, respectively, in 2005). **This implies that having a salaried job in the public sector does not guarantee an escaping from poverty. Nor does having a salaried job in the private sector.** In fact, about 40 percent of poor household heads have such jobs—compared to 27 percent of nonpoor heads (with similar proportions in 2005). In contrast, differences are not large with respect to self-employment among poor and nonpoor (23 and 24 percent, respectively, in 2010, and 26 percent each in 2005), although this is not entirely surprising given that self-employment includes a wide range of heterogeneous occupations, from highly skilled professionals to low-skilled street vendors. Interestingly, nonpoor household heads are four times more likely to work as professionals or mid-level professions than poor heads (only twice as likely in the case of office workers), both in 2005 and 2010. By sector, the poor work in similar shares (one-third) in agriculture, industry and services (both in 2005 and 2010), while more than one half of the nonpoor (53 percent) work in services, followed by industry (28 percent) and agriculture (20 percent in 2010).

These profiles indicate that labor is a relevant correlate of poverty in Tunisia, but by no means a critical one. In effect, households headed by someone with a job in the public sector are not guaranteed a path out of poverty. Neither does having a job in the private sector, being self-employed, or working in services. Contributing to this is the fact that both poor and nonpoor households have a similar distribution of occupations among members other than the household head. Thus, on average, other household members' occupations do not seem to ensure that certain households will escape from poverty.

Notable gaps in the access to basic services are also observed between poor and nonpoor households. In 2010, about 66 percent of poor households had access to tap water, compared to 87 percent among the nonpoor. Wider differences are observed for access to sanitation services, such as a flush toilet within the home, are enjoyed by only 14 percent of poor households, but by half (49 percent) of nonpoor households. Connection to sanitation services for the poor in 2010 was 35 percent, compared to 61 percent of nonpoor households. Where differences narrow down significantly is in access to electricity, which is almost universal in Tunisia. Regarding access to education, children for both poor and nonpoor start on time—more than 95 percent in both cases. Yet, when looking at those who finish school, there is a clear socioeconomic gap: a 20 percentage point chasm exists between those children from poor households finishing sixth grade (57 percent) and children from nonpoor households (77 percent). So, even if poverty status does not seem to matter at the beginning of schooling, it does in terms of performance. And these gaps appear to have increased between 2005 and 2010.

Poverty status also matters in terms of asset ownership (see figure 8). Durables such as televisions, refrigerators, and cell phones are the assets most frequently owned by Tunisian households and where differences between the poor and nonpoor are low. Almost 98 percent of nonpoor households own a television, 97 percent a refrigerator, and 85 percent a cell phone. Among the poor, ownership is 92

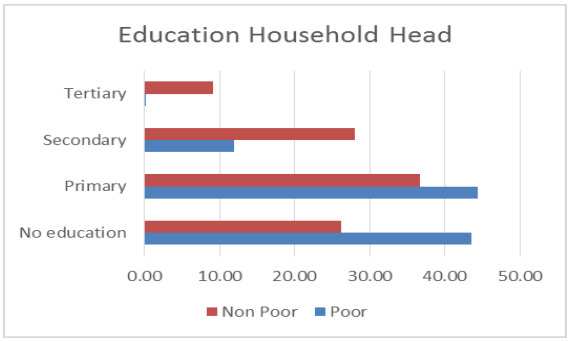
percent, 83 percent and 73 percent, respectively. Differences are also narrow for those assets rarely owned across Tunisia, such as freezers and bicycles (less than 5 percent of households, regardless of socioeconomic status). Instead, differences are starker among assets such as cars or motorcycles (some 30 percent of nonpoor households own a car or motorcycle compare to 8 percent among the poor), phones, and radios. These findings for 2010 apply closely to 2005 as well.[22]

In conclusion, while the previous—and official—profiles correctly stress the relevance of region, education, and profession as key correlates of poverty, a more comprehensive profiling exercise shows that there are a limited number of sociodemographic features that the poor and nonpoor share. Furthermore, neither the education of the household head nor that of other members is critical to determine who will either escape or be condemned to poverty. Neither will professional categories, occupation, and sector. Access to some basic services (but not all) and asset ownership vary between the poor and the nonpoor. In other words, there does not exist a dominating correlate to poverty, but a set of marked differences across different dimensions of human capital, physical access, labor and demographic features.

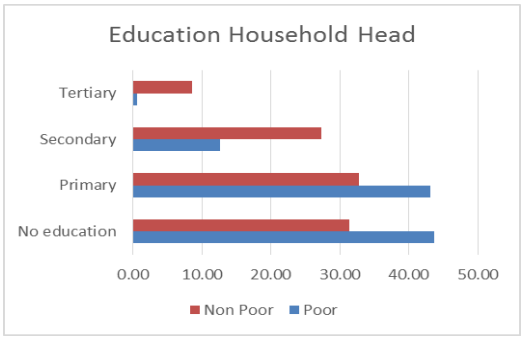
[22] In statistical terms, t-tests of the means of key variables in the profiles of poor and nonpoor (appendix 2) suggest that even though changes in the characteristics of the poor between 2005 and 2010 may not have been substantive in magnitude, they may have been statistically significant. In fact, all categories monitored show statistically significant different means between both years, except for the shares of poor in households headed by individuals aged 40–64 years with tertiary education, who are unemployed and located in Grand Tunis and the center and southern regions. Also, access rates to flush toilets, sanitation, children finishing sixth grade, and ownership of cars or motorcycles among the poor did not show statistically significant differences in either years (see test 3 in table A3.1).

Figure 8. Profiles for Poor and Nonpoor, 2005–10

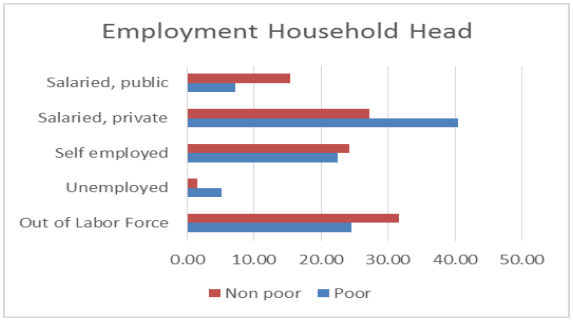
2010



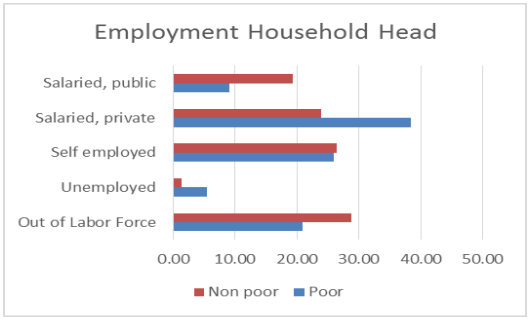
2005



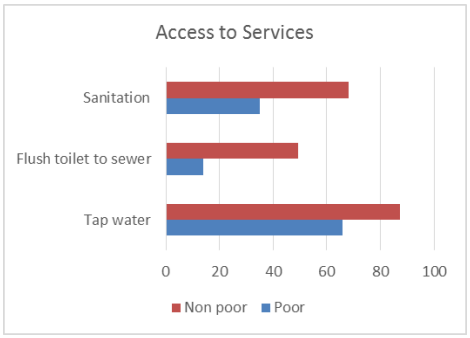
2010



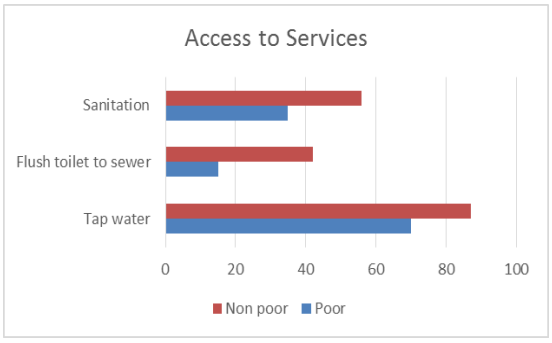
2005



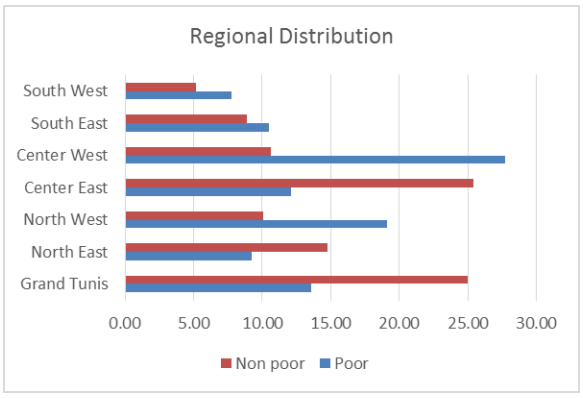
2010



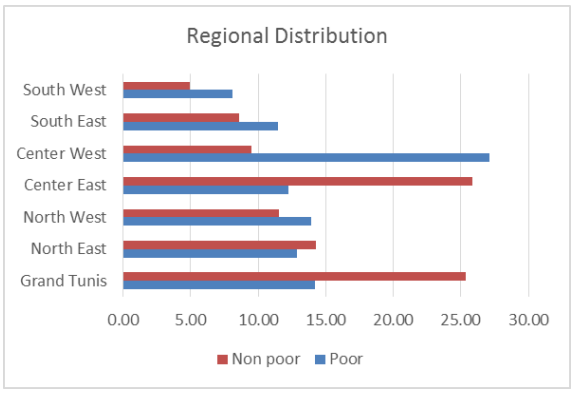
2005



2010



2005



Source: World Bank estimates using ENBCV 2005, 2010.

Table 8. Poverty and Bottom 40 Percent Profiles, 2005–12

	2005 Poor	2005 Bottom 40%	2005 Nonpoor	2010 Poor	2010 Bottom 40%	2010 Nonpoor	2012 Poor	2012 Bottom 40%[c]	2012 Nonpoor
I. Sociodemographics									
1. Household size	6.43	6.19	5.06	6.15	5.79	4.90	5.78	5.30	4.51
2. Number of rooms per capita	0.42	0.46	0.74	0.45	0.52	0.77	0.47	0.57	0.79
3. Education of household head (% of households with heads having attended):									
No school	43.66	43.94	31.43	43.53	39.03	26.24	41.64	36.49	21.68
Primary	43.16	41.52	32.72	44.38	44.88	36.67	46.16	45.84	36.95
Secondary	12.59	13.69	27.34	11.87	15.38	28.01	11.70	16.50	30.33
Tertiary	0.59	0.85	8.51	0.22	0.72	9.09	0.50	1.17	11.04
4. Age of household head (% households with heads aged):									
15–24	0.08	0.14	0.26	0.20	0.14	0.11	0.34	0.37	0.73
25–39	18.43	18.04	15.54	16.09	14.85	13.29	22.00	19.87	18.38
40–64	65.83	63.87	63.06	65.68	65.01	66.10	60.89	61.24	63.62
65+	15.66	17.95	21.13	18.03	20.00	20.50	16.78	18.53	17.27
Age, in years	50.12	50.85	52.67	51.59	52.60	53.72	49.94	51.02	51.36
5. Sex of household head									
Male	89.15	88.83	87.19	87.35	89.08	89.64	88.83	88.41	88.20
Female	10.85	11.17	12.81	12.65	10.92	10.36	11.17	11.59	11.80
6. Location									
Urban	53.01	43.84	68.95	49.79	44.63	68.53	43.56	42.54	71.53
Rural	46.99	56.16	31.05	50.21	55.37	31.47	56.44	57.46	28.47
7. Region									
Grand Tunis	14.23	12.27	25.37	13.56	13.06	24.97	9.66	11.41	26.09
Northeast	12.90	14.44	14.25	9.27	13.49	14.79	11.53	14.91	14.32
Northwest	13.94	16.39	11.54	19.10	17.98	10.11	21.72	18.82	9.53
Center east	12.26	14.52	25.87	12.09	15.87	25.40	10.08	15.42	25.71
Center west	27.14	24.08	9.46	27.68	22.19	10.65	32.40	23.49	9.66
Southeast	11.46	10.49	8.57	10.53	9.73	8.88	7.50	8.78	9.29
Southwest	8.07	7.81	4.94	7.77	7.68	5.21	7.12	7.18	5.40
II. Labor									
8. Household head labor status (% of households with heads whose labor status is:									
Out of labor force	20.89	21.29	28.80	24.55	25.53	31.63	27.29	29.70	32.23
Unemployed	5.54	4.22	1.41	5.18	3.62	1.49	5.34	3.37	1.56
Self-employed	25.94	29.21	26.38	22.56	25.46	24.24	n.a.[d]	n.a[d]	n.a.[d]
Salaried, private	38.40	34.81	23.92	40.50	36.57	27.20	n.a.[d]	n.a[d]	n.a.[d]
Salaried, public	9.09	10.36	19.38	7.21	8.80	15.43	n.a.[d]	n.a[d]	n.a.[d]
9. Number of household members other than head whose labor status is:									
Out of labor force	2.10	2.00	1.69	2.07	1.99	1.71	1.79	1.72	1.52
Unemployed	0.26	0.25	0.20	0.37	0.36	0.27	0.32	0.30	0.25
Self-employed	0.29	0.34	0.30	0.18	0.21	0.19	n.a.[d]	n.a.[d]	n.a.[d]
Salaried, private	0.37	0.40	0.46	0.39	0.46	0.47	n.a.[d]	n.a.[d]	n.a.[d]
Salaried, public	0.04	0.04	0.14	0.04	0.05	0.14	n.a.[d]	n.a.[d]	n.a.[d]
10. Sector of employment of household head (% of employed household heads that work in):									
Agriculture	32.78	35.11	20.92	30.03	32.18	19.26	33.64	30.39	15.80
Industry	34.33	30.41	24.65	39.10	32.96	27.66	32.56	32.62	30.81
Services	31.89	33.55	53.84	30.36	34.39	52.61	33.52	36.69	53.04
11. Household head's profession (for those working)									
Professional	5.11	6.17	19.98	4.99	6.49	19.61	3.41	4.84	16.90
Mid-level professional	1.85	2.21	7.53	1.34	1.92	7.38	1.56	2.41	6.40
Office worker	6.94	7.08	13.54	6.18	7.99	12.98	12.76	14.33	19.06
Other	85.83	84.20	58.67	87.49	83.60	60.00	82.24	78.39	57.56
12. Work in public sector (share of households with… working in public sector):									
Household members (other than head)	0.13	0.15	0.34	0.12	0.15	0.30	n.a.[e]	n.a.[e]	n.a.[e]
Household head	12.79	14.30	28.38	11.22	13.05	23.71	n.a.[e]	n.a.[e]	n.a.[e]
13. Dependency rate	0.45	0.44	0.35	0.43	0.39	0.33	0.44	0.40	0.33
III. Access to basic services									
14. Share of households with access to basic services (%):									
Tap water	70.13	69.13	87.25	65.80	70.05	87.24	62.61	70.56	89.06

	2005 Poor	2005 Bottom 40%	2005 Nonpoor	2010 Poor	2010 Bottom 40%	2010 Nonpoor	2012 Poor	2012 Bottom 40%[c]	2012 Nonpoor
Flush toilet	15.26	16.96	41.92	13.75	25.19	49.34	n.a.[f]	n.a.[f]	n.a.[f]
Electricity	96.66	97.24	99.34	97.92	98.88	99.72	98.53	99.03	99.62
Sanitation[b]	35.33	31.13	56.37	34.91	35.12	60.79	n.a.[f]	n.a.[f]	n.a.[f]
Children start school on time:	92.17	91.88	96.01	95.31	96.26	96.98	n.a.[f]	n.a.[f]	n.a.[f]
Children attend school	92.86	92.98	96.64	88.89	92.21	96.41	n.a.[f]	n.a.[f]	n.a.[f]
Children finished sixth grade	57.50	59.19	72.97	57.09	64.72	77.69	n.a.[f]	n.a.[f]	n.a.[f]
IV. Asset ownership									
15. Share of households owning (%):									
Radio	41.30	42.56	52.19	32.10	37.36	48.84	43.33	51.29	69.28
televisions	85.38	88.26	96.47	91.95	94.36	97.56	93.16	95.50	98.32
Refrigerator	71.11	76.12	92.92	82.59	89.01	96.71	85.17	90.25	96.22
Car or motorcycle	7.98	11.23	30.73	7.66	11.96	29.42	14.86	19.57	34.81
Computer	0.97	1.14	13.07	2.34	4.49	25.17	n.a.[g]	n.a.[g]	n.a.[g]
Phone	16.41	17.92	43.45	6.82	8.82	28.41	n.a.[g]	n.a.[g]	n.a.[g]
Cell phone	39.79	45.93	66.27	72.76	76.51	85.13	n.a.[g]	n.a.[g]	n.a.[g]
Freezer	1.83	1.42	4.11	1.21	1.82	5.95	1.79	1.67	2.64
Bicycle	5.71	5.28	6.44	3.60	4.17	4.62	3.49	3.90	4.64
V. Consumption									
16. Monthly per capita household consumption	72.52	88.20	239.10	73.76	104.51	256.40	n.a.[h]	n.a.[h]	n.a.[h]
17. Share expenditure on food	47.24	46.70	39.06	40.24	38.79	32.46	n.a.[h]	n.a.[h]	n.a.[h]

Source: World Bank staff's estimates from ENBCV 2005 and 2010, and ENPE 2012.
a. Category primary incomplete not reported here: hence, reported categories in table do not add to 100%.
b. Sanitation refers to the household being connected to the sanitation network.
c. ENPE 2009 and 2012 do not report consumption or make labor earnings information publicly available.
d. ENPE 2012 does not report self-employment and salaried status of the worker.
e. ENPE 2012 does not report public versus public nature of firm or activity of worker.
f. ENPE 2012 does not report access to water and sanitation services nor sufficient information for children's school access.
g. ENPE 2012 does not report ownership of assets such as computer, phone, and cell phone (which are, instead, provided by ENBCV 2005 and 2010).
h. ENPE 2012 does not report consumption nor make labor earnings information publicly available.

3.4. Post-Revolution Updated Poverty Profile

Post-revolution poverty correlates in 2012 are very similar to those observed pre-revolution. In effect, household size, rooms per capita, age, and gender features of household heads, labor characteristics regarding inactivity shares, sector and professions of working household heads, and dependency rates within the household are all rather similar between the poor in 2010 and 2012 and for the nonpoor in both years (table 9). And so is their distribution between urban and rural locations and the shares of poor households across regions in both years. The poor's access to basic services regarding tap water and electricity,[23] and their ownership rates among most assets considered,[24] are also similar between 2010 and 2012. This is also the case among nonpoor households in both years (appendix 3 reports the statistical difference means tests for all of these features across years and socioeconomic groups).

Interestingly, there are a number of categories that cannot be compared intertemporally between the ENPE and ENBCV because the former does not report information on a number of variables, or the categories reported are not strictly comparable with ENBCV. Regarding lack of information in ENPE, this is the case of active labor status categories (that is, self-employment and salaried—unemployment is reported along with out of labor market in both surveys) and public and private sector jobs. In terms of access to services, it is not possible to determine access to flush toilets, sanitation, and start, attendance

[23] Those are the only ones for which both ENBCV 2010 and ENPE 2012 both report information.
[24] Such assets include television, computer, phone, cell phone, bicycle, car or motorcycle, refrigerator and freezer, except for radio, where differences are notable between both years.

and completion of education services by children of the household from ENPE surveys. ENPE surveys also fail to provide information on computer, phones, cell phones, and freezers. In addition, ENPE surveys do not provide information on consumption nor the share of household expenditures on food. Finally, in the case of educational variables considered in the profile, that is, educational attainment of household heads and other members, differences between the reported categories from both ENPE and ENBCV make their comparison troublesome.[25]

In post-revolution 2012, the poor continued to live in more crowded households than the nonpoor (almost 6 compared to 4.5 members, respectively; table 9). The concentration of the poor in rural areas exceeds that of urban poor (56 percent versus 44 percent, respectively), while the opposite occurs among the nonpoor: 72 percent live in urban areas and only 28 percent in rural locations (figure 9). The post-revolution poor are also concentrated in western regions (60 percent), while only 25 percent of the nonpoor lived in these regions in 2012. The shares of out of labor force and unemployed household heads in 2012 are very similar to those observed pre-revolution in 2010: almost one-third of the nonpoor are out of the labor force compared to some 27 percent of the poor. The proportion of unemployed poor is 3.5 times larger than the unemployed nonpoor (5.5 versus 1.5, respectively) among household heads, and less than 2 percent among members other than household heads. The post-revolution household head poor keep working in agriculture, industry, and services in equal shares, about 33 percent each (figure 9). In the case of the nonpoor, 53 percent of household heads worked in services, 31 percent in industry, and 16 percent in agriculture in 2012. About 24 percent of nonpoor household heads are professionals compared with only 5 percent among the poor. Dependency rates have hardly varied between 2010 and 2012, reaching 0.44 among poor households and 0.33 among nonpoor.

Access to tap water in 2012 report the same important gaps between the poor and nonpoor (63 percent vs. 89 percent, respectively) than observed in previous years, while for electricity, such differences do not exist with an access close to universal (over 99 percent for both poor and nonpoor). Among assets, televisions and refrigerators continue to be reported as those most frequently owned by Tunisians, with narrow gaps of ownership between the poor and nonpoor. Thus, 93 percent of poor households and 99 percent of nonpoor have a television set; while 85 percent of poor and 96 percent of the nonpoor have a fridge. About a third of nonpoor household own a car or motorcycle while only 15 percent of poor households do. Radios are more likely owned by the nonpoor (69 percent) than the poor (43 percent), while freezers and bicycles are owned by very few Tunisians, with no marked differences among the poor and nonpoor (less than 5 percent in both cases).[26]

Comparing profiles does not provide the ability to determine the *causes* for intertemporal changes or lack thereof. However, it is reasonable to think that many of the key dimensions considered, such as

[25] In terms of definitions, ENBCV-based attainment is obtained from an interaction of two variables: the highest level of education completed (with 9 categories) and the education cycle to which the individual is currently attending (with 16 possible categories). In the case of the ENPE, the education variable reports four levels of instruction (none, elementary, secondary, and tertiary). In terms of samples, the ENBCV reports education for each individual aged 3 years and older, while the ENPE does for individuals aged 10 years and older. In terms of member's residency status, it is unclear how the variable is constructed in the ENPE. Given these differences, trends for educational attainment of household head and other household members in the profiling of pre- and post-revolution for the poor, nonpoor, and b40 population should be considered tentative. Results for ENBCV-based years are considered consistent given the same definition and categories officially provided by INS, ADB, and World Bank (2012).

[26] In terms of statistical differences, means t-tests for the 2010 and 2012 profiles suggest statistically significant differences across most categories (appendix 2, tests 5 and 6, table A3.1). These results should, however, be taken very cautiously given the t-tests are affected by very low standard variations, common in population-expanded estimations. This results in very large estimates of the mean t-test differences and a high probability of accepting differences, even though they do not appear to be substantive in magnitude. The same applies to t-tests among poor, nonpoor, and b40 categories for 2012.

demographics, location, asset ownership and access to basic services, are unlikely to suffer substantive changes—at least in absolute terms and magnitudes—within a two year span. Also, for those variables more susceptible to rapid change, for example, labor conditions, it is also reasonable to think that changes in 2012 would have possibly compensated for changes that occurred in 2011—when the revolution might have taken a harsher toll on unemployment. In other words, by looking at 2012 rather than 2011, changes with respect to pre-revolution 2010 that might have been taken place in 2011 may well have been partially reversed. Finally, the very imputation of consumption in 2012 and, ultimately, the resulting identification of poor and nonpoor categories among 2012 households, is based on the observed consumption in 2010 without structural changes allowed in 2012 (that is, keeping constant their structure of consumption or, in other words, imposing returns to factors to be constant over time). All these factors are consistent with the reported similarities found by and large between the 2010 and 2012 poverty profiles.

Figure 9. 2012 Profiles for Poor and Nonpoor

Source: World Bank staff's estimates using ENBCV 2010 and ENPE 2012.

3.5. Who Are the Bottom 40 Percent of the Population?

The profile for the Tunisian b40 population reported in table 9 suggests that they live in crowded households: in 2012 the average size of a b40 household was 5.3. The b40 are concentrated in western regions (50 percent of total b40 population in 2012, figure 10). About 81 percent of the b40 household heads have primary or less as highest educational attainment. Over 60 percent of b40 individuals live in households whose head is in the 40–64 age group, and close to 90 percent have a male head. Only 9 percent of b40 household heads have a salaried job in the public sector; 37 percent a salaried job in the

private sector, and 25 percent are self-employed.[27] Their sectoral composition is balanced among agriculture, industry and services, 33 percent each. Almost all b40 households have access to electricity; some 70 percent have access to tap water, and only 17 percent have access to flush toilets. In terms of education, 96 percent of b40 children start on time, 92 percent attend school, and 64 percent finish sixth grade. Most b40 households have televisions (94 percent), refrigerators (89 percent), and, to a lesser extent, cell phones (76 percent). About one-third have a radio, about 12 percent a car or motorcycle, 9 percent a phone, and less than 5 percent have a computer, a bicycle, or a freezer. In terms of consumption patterns, they spend 39 percent of their expenditures on food.[28]

Given the levels of poverty in Tunisia—23 percent in 2005, 15 percent in 2010, and around 13 percent in 2012—the b40 population comprises all the poor and a relevant share of the nonpoor. Consistent with that fact, **the b40 socioeconomic and demographic profile described above systematically falls between those of the poor and the nonpoor** (table 9)**.** In effect, the size of b40 households lies between that of average poor household and the nonpoor. So does their number of per capita rooms, the distribution of educational attainment among their household heads, distribution between urban and rural locations, and all occupation, sector, and professional categories of labor. This is also true for access rates to the basic services monitored in the analysis and the ownership of assets and household durables. In terms of per capita consumption and the share of food as part of total expenditures, b40 averages once again fall between poor and nonpoor categories. This is the expected result of the very composition of the b40 socioeconomic group and is systematically observed in 2005, 2010, and 2012.

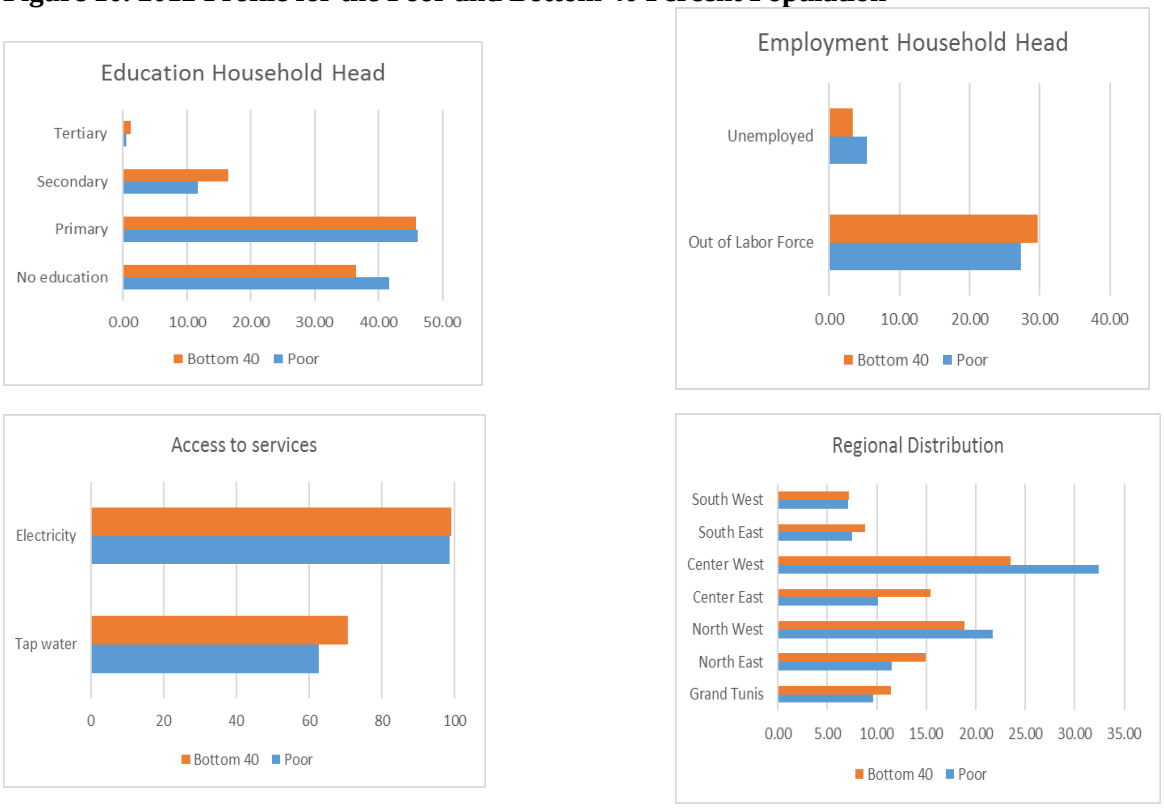
What it is perhaps more important is that the profile of the bottom 40 percent appears more closely aligned to that of the poor than the nonpoor for multiple variables considered in each year. When looking at the magnitude of key variables analyzed (table 9), a close alignment of the profiles between the poor and b40 is evident for the urban and rural distribution of both groups: thus, 44 percent and 43 percent, respectively, of poor and b40 households live in urban areas compared to 72 percent among the nonpoor in 2012. For those years with reliable information, 2005 and 2010, between 75 percent and 80 percent of heads of poor and b40 households report incomplete primary education or less as their highest educational level attended compared to 53 percent of the nonpoor. Concentration of poor and b40 households geographically is similar in western regions (60 percent of the poor lived in these regions in 2012 and 50 percent of the b40), compared to the concentration of nonpoor in those regions, at only 25 percent. Relative to labor characteristics, the distribution of sectors among the poor and b40 aligns closely (each category comprising about one-third of working household heads) as is the case also for the professional categories considered in this analysis. Regarding basic services, access to tap water, flush toilets, and sanitation services of the b40 households are closer to those access rates of the poor than the nonpoor. Instead, for services close to universal access (such as electricity and children's start to schooling), there are no substantive differences among the poor, b40, and nonpoor households. For most of the assets considered, b40 ownership of radio, car or motorcycle, computer, phone, and cell phone aligns closely to the ownership profile of the poor. Finally, in terms of consumption per capita of households, the average consumption for a poor household in 2010 is much closer to that of a b40 than a nonpoor household. In effect, at US$104 2005 PPP (purchasing power parity), the per capita monthly consumption of b40 households is 40 percent above the per capita consumption of the poor (US$74 2005 PPP), but less than half of the average consumption of a nonpoor household (US$256 2005 PPP; table 9).

Notwithstanding the closer alignment between the poor and b40 profiles for multiple categories, there are also several categories where b40 profiles do not align closely with the poor. This is the case for household size and rooms per capita; age structure among household heads; labor status and occupation of household head; children's school attendance and rate of children finishing sixth grade; and b40 ownership of durables such as televisions, refrigerators, and freezers. Among consumption variables, the

[27] It refers to 2010 because the 2012 ENPE does not report such categorization.
[28] Assets and access to services also refer to 2010 due to a wider set of indicators available.

share of food expenditures on total expenditures of the household also suggests that the b40 approximately fall midway between poor and nonpoor shares.

Figure 10. 2012 Profile for the Poor and Bottom 40 Percent Population



Source: World Bank staff's estimates using ENBCV 2010 and ENPE 2012.

Like the profiles for the poor and nonpoor, the b40 population have not changed much post-revolution. In general terms, the structure of educational attainment of household heads hardly varied between 2010 and 2005. Nor did their age structure or the share of households headed by males or residing in urban (compared to rural) areas between 2005 and 2012 (table 9). The distribution of b40 households across regions is also fairly consistent across all the years considered. In terms of labor, the shares of inactive and unemployed household heads do not show large discrepancies for 2005, 2010 and 2012. Sector of activity and professional grouping are also similar for all years considered, and so is the dependency rate among b40 households. Access rates to tap water and electricity are very close during 2005–2012, and so is sanitation and children's school attendance.[29] Among assets, ownership rates of Televisions, refrigerators, freezers and bicycles remained rather stable over time. Average consumption per capita of b40 households in 2010 is comparable to 2005 once inflation is taken into account, that is, there is not a substantive variation of purchasing power in both years among b40 households.[30]

[29] For these two indicators, however, the valid reference period is 2005 and 2010 for lack of information reported for such indicators in the 2012 ENPE.

[30] In effect, the 88.20 US$ 2005 PPP per capita household consumption would have a value of 108 US$ 2005 PPP in 2010 after correcting for annual inflation in between years, very close to the reported 104 US$ consumption observed in the 2010 ENBCV.

In contrast, changes over time for the b40 profiles are observed in regards to household size, with declines over time; increasing access to flush toilets, children starting on time and finishing sixth.[31] Ownership of cell phone hiked between 2005 and 2010, in detriment of phones, while that of Televisions and radios also improved notably. Computer also increased although did not shift substantially their low density among this population group. Finally, the share of spending on food went down substantially in both years.

In conclusion, the b40 group in Tunisia comprises all the poor and a substantive share of the nonpoor—closer to the poverty line than the remaining b60 group. So, by the very composition of this group, its socioeconomic profile does fall between that of the poor and the nonpoor, aligning itself closer to that of the poor in multiple dimensions. This is so for 2005, 2010, and 2012. Evidence suggests that there have not been substantive changes in the profile of those households pertaining to the b40 group in 2005 and 2010; and for comparable features, this has also been the case between 2010 and 2012. As argued before, the nature of key features profiled, the relatively short period of time—two years—after the revolution, and technical issues in the identification of the poor based on the cross-survey imputation all may have contributed to small changes over time.

It is worth concluding that the cross-survey imputation technique has for the first time made possible the construction of a rich and extended poverty profiling exercise in Tunisia. Not shown in this chapter, but presented in appendix 4, a profile for 2009 was also constructed following this methodology. The 2009 poverty profile confirms all key results found between 2005 and 2010. But the current analysis also shows the limitations of an enhanced profile exercise in Tunisia. First, it is not possible to extend the analysis beyond 2012, because there are no complete ENPEs available after that year (and the 2015 ENBCV is currently being collected). Second, even though the post-revolution profile has been compared to that of 2010—and 2005—for all socioeconomic, geographical, labor, service access and asset ownership dimensions, there are some notorious missing features—in ENPEs—that limit a more thorough intertemporal analysis. This is the case for occupation categories, several basic services, and a number of household assets. **More substantive work in terms of increasing the availability of existing data sources, collecting regularly updated sources, and eliminating definitional discrepancies among sources is needed to better understand poverty and disparities profiles over time.**

[31] The trend for toilets and education refer to the 2005 —2010 period.

Chapter 4: Has Vulnerability to Poverty Increased in Tunisia?

4.1 Defining Vulnerability to Poverty: The Simple Notion of "Robustness" to (Monetary) Poverty

INS, ADB, and World Bank (2012) acknowledge that, despite sustained poverty reduction, the consumption of many households in Tunisia is just above the poverty line. Consequently, those households remain vulnerable to economic shocks—loss of employment, price rises—or shocks of other sorts—illness, catastrophic events—that would plunge them back into poverty, especially in rural areas. Measured by the number of people having expenditures about 30 percent above the poverty line, old estimates by the World Bank (2004) suggest that the share of the vulnerable among the total population in Tunisia rose from 14 percent in 1990 to 17 percent in 1995. Unfortunately, there have been no recent official or alternative efforts to capture the degree of vulnerability among Tunisian households in more systematic and quantitative terms. Box 4 presents a succinct description of definitions and measures of vulnerability to poverty used elsewhere, providing the basis for the analysis conducted in this section. This analysis presents a set of alternatives based on both monetary and nonmonetary approaches to vulnerability to poverty. These approaches—applied gradually to Tunisia, from simplest to more sophisticated—all share the basic notion that vulnerability to poverty captures an expectation or probability to future poverty.

Box 4. Defining and Measuring Vulnerability to Poverty

In its simplest form, vulnerability to poverty is an ex ante notion that reflects future prospects of poverty in the presence of risks (Chaudhuri 2003). This definition goes beyond a mere concept of an individual, household or community's ability to smooth consumption in the face of shocks; or a notion of households' exposure to adverse shocks that ignores the current poverty status of the household (Chaudhuri 2003). Vulnerability to poverty captures today's *expected* poverty, taking into account a household's exposure to shocks, that is, risks, its capacity to prevent/mitigate or cope with them; and its long-term income-generation capacity.

Ideally, the notion of vulnerability to poverty as expected poverty would be estimated as the proportion of the population with a consumption level above a current poverty line Z_0 in time *0* that will fall below the poverty line Z_1 in time *1* within a certain probability (Dang and Lanjouw 2014). In this line, Pritchett, Suryahadi, and Sumarto. (2000) define a vulnerability line for Indonesia as the level of income below which a household experiences a greater than even chance of experiencing an episode of poverty in the near future. However, their 50 percent probability threshold is arbitrary and allows as "vulnerable" even those households that are currently poor. Dang and Lanjouw (2014) define, instead, a population that is clearly not poor, but that face a real risk of falling into poverty. They apply this definition to India, the United States, and Vietnam and exclude the current poor from the measurement of vulnerability. Lopez-Calva and Ortiz-Juarez (2014) define vulnerability to poverty as the opposite notion to remaining economically secure—which they equate to belonging to a middle class that is characterized by a status of food security. Using panel data for Mexico, Chile and Peru, they define the vulnerable as those nonpoor households with a 10 percent or higher probability of becoming poor in five years.

Other analyses have used more ad hoc measurements. World Bank (1995b) defined multiple poverty lines in Ecuador and simply designated the highest of those lines as a "vulnerability line." For India, NCEUS (2007) defined vulnerability as simply occurring within a fixed income range, between 1.25 and 2 times the national poverty line, and World Bank (2004, 2012) defined it as some 30 percent above the poverty line in Tunisia and Vietnam. Similarly, a number of studies focusing on identifying the middle class has set an income falling within an interval defined in absolute values (Banerjee and Duflo 2008; Ravallion 2010) or relative to the whole income distribution (Pressman 2007) or some combination of these two (Birdsall 2010). Once the middle class is defined, the vulnerable are those between the poor and the middle class. A well-known examples of this practice is Banerjee and Duflo (2008), who define households in developing countries as belonging to the middle class if their daily expenditures are between US$2 and US$10 PPP. In Latin America, Ferreira et al. (2013) following a similar approach, define vulnerable households as those between US$4 and US$10 PPP.

Source: Chaudhuri (2003); Ferreira et al. (2013); Dang and Lanjouw (2014).

A first approach to assess vulnerability to poverty simply recalculates new poverty rates after the reference poverty lines are changed. More than a proper analysis of vulnerability, this exercise is a robustness assessment of poverty incidence across alternative poverty lines and shows the share of the nonpoor population that would become poor after changes in their consumption equivalent to a certain change in the reference poverty line. Using data for 2010, this robustness exercise in Tunisia finds that an additional 2.3 percentage points of the population (about 250,000 Tunisians) would have fallen into poverty if the poverty lines had been some 5 percent higher than the official lines, that is, between TD 41 and 64 per capita per year (for noncommunal areas and cities, respectively). In other words, shocks of any nature that would have reduced Tunisian households' per capita consumption by TD 41 and 64 would have led to poverty increases of 2.3 percentage points (table 10). If poverty lines had increased by 20 percent in 2010, the incidence of poverty would have increased by 60 percent of the level observed in 2010, or almost 10 percentage points.

Similarly, *decreasing* the value of the poverty line by 5 percent would have reduced poverty by 2 percentage points. Had the decrease been 20 percent of the value of the poverty line, the reduction in poverty would have been about 7 percentage points. This confirms that there is a substantive share of the country's population—17 percent—spending within 80 percent and 120 percent of the equivalent value of the official poverty line, and therefore, relatively close to changing their poverty status following changes in their consumption around 20 percent. This is particularly serious in a context like the Tunisian revolution, relatively volatile GDP growth, increasing inflation, fluctuating unemployment rates, and subsidy reforms in the agenda that can lead to sizeable consumption swings in the short term.

By urban and rural location, poverty rates among cities are those with the highest sensitivity to changes in their poverty lines. A 5 percent increase in the urban poverty line would lead to a 21 percent jump in their poverty rate, or less than 2 percentage points. Rural or noncommunal areas are those presenting the lowest impacts from increases in their poverty lines (in relative terms, about half the variation found among cities).

Table 9. Robustness Check for Alternative Poverty Lines, 2010

	Nationwide		**Noncommunal areas**	**Medium-sized villages**	**Cities**
	Poverty incidence (pp)	Change from actual (%)	Change from actual (%)	Change from actual (%)	Change from actual (%)
Actual	15.5	0.0	0.0	0.0	0.0
Increase 5%	17.8	15.2	11.1	18.0	21.6
Increase 10%	20.1	29.9	22.3	34.2	43.8
Increase 20%	24.9	60.5	43.4	74.7	83.2
Decrease 5%	13.4	-13.6	-11.5	-16.1	-14.9
Decrease 10%	11.5	-25.9	-22.8	-28.4	-30.4
Decrease 20%	8.4	-45.5	-41.3	-48.8	-51.5

Source: World Bank staff estimates using ADEPT.
Note: pp = denotes percentage points. Actual poverty lines for 2010: TD 1,277, TD 1,158, and TD 820 for cities, medium-sized towns, and noncommunal areas, respectively. The poverty rate in 2010 for cities was 9 pp, 14 pp for medium-sized villages, and 22.6 pp for noncommunal areas.

4.2 Vulnerability as Probability of Being Poor

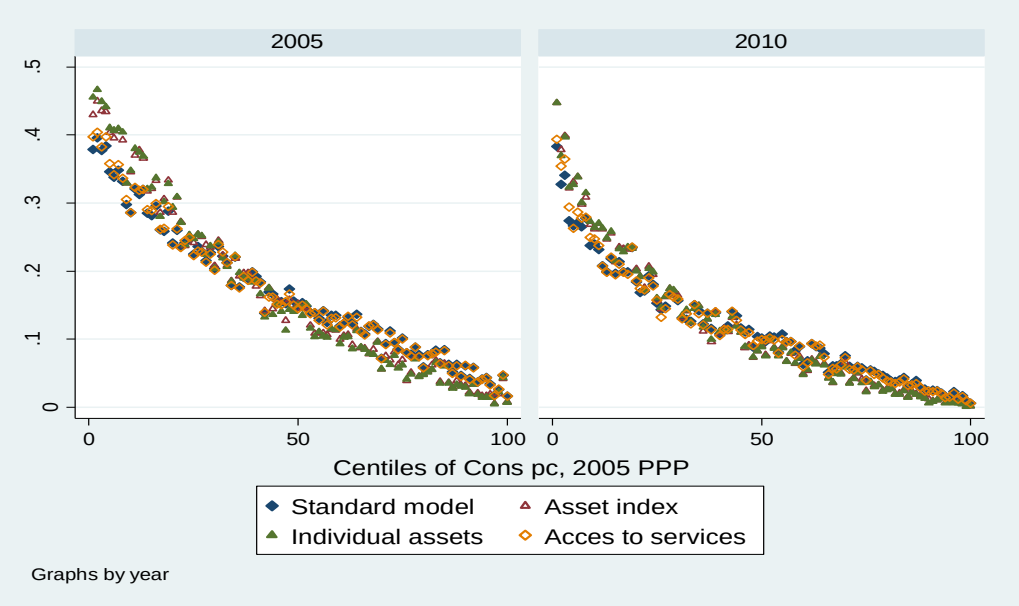
However, the notion of vulnerability as "robustness to poverty" is fairly simplistic and tells little about the identity of the vulnerable or what factors put them at risk. More importantly, vulnerability to monetary poverty defined in terms of sensitivity to changes in the poverty line completely ignores the notion that certain individual and household characteristics and conditions make households more (or less) at risk of falling into poverty, and less equipped to cope with risks and shocks that push them into poverty. If that is the case, one would like to know the extent to which several characteristics and decisions of individuals and households (also of communities if systemic risks are considered) determine households' vulnerability to being poor. Tying the analyses in chapters 4 and 5 with the current notion of vulnerability to poverty, the four key dimensions used in poverty profiling and consumption modeling—sociodemographics and location; labor; access to services; and asset ownership—are also considered in assessing the determinants of vulnerability to poverty.

Based on the consumption model estimated in chapter 4 (and appendix 2), figure 11 shows the vulnerability to being poor in Tunisia for 2005 and 2010 as a probability conditional to certain household characteristics. Specifically, figure 11 shows the average predicted probability of being poor across each percentile of the distribution of household per capita consumption. Probabilities are first predicted according to a simplified model, the "standard model," which contains only sociodemographic and labor features. To that model, a few select assets[32] are added, leading to probability estimates labeled as "individual assets." Next, a new set of estimates is produced using an "asset index," which captures all assets for which information is available. A final model is estimated after adding access to basic services to the already included standard sociodemographic and labor characteristics. Results are presented under the "access to services" label.

Figure 11 confirms that **the predicted probability of being poor decreases as consumption increases**. This was totally expected as it simply reflects the fact that at higher levels of economic security—captured by higher consumption levels—the probability of being poor diminishes. In the case of Tunisia, this result is robust to the choice of determinants used in the modeling exercise. What remains an empirical mystery are the *exact* probabilities of being poor across consumption levels. And this analysis for Tunisia shows that, **despite the overall reduction observed in poverty rates between 2005 and 2010, the probability of falling into poverty for any household in 2010 still remains considerably high.** For example, households in the percentile 40th of the distribution, that is, those that separate the bottom 40 percent and nonpoor categories, had an average 34 percent probability of being poor in 2005. Their probability of being poor in 2010 was 24 percent.

[32] The extension of the standard model labeled "individual assets" includes binary regressors that control for whether the household owns an air conditioner, satellite dish, washing machine, oven, car, and the number of rooms in the dwelling. The asset index model includes as a regressor an index calculated from the first component of a principal components analysis of the same set of assets owned by the household and the number of rooms of the dwelling.

Figure 11. Vulnerability to Being Poor in Tunisia, 2005 and 2010



Source: World Bank staff estimates from ENBC 2005 and ENBC 2010.
Notes: "Standard model" refers to a model that predicts being poor based on socioeconomic and demographic characteristics, without including assets or access to services. "Individual assets" adds ownership of specific assets to the standard model. "Asset index" includes an asset index obtained from applying principal component analysis to the distribution of assets reported by households. "Access to services" adds the household coverage of basic services (water, electricity and sanitation) to the standard model.

Building from the Lopez-Calva and Ortiz-Juarez (2014) definition of households vulnerable to poverty as those nonpoor households with a probability of 10 percent or higher probability of being poor, figure 11 suggests that 56 percent of the population in 2005 and still 46 percent in 2010 would be considered vulnerable.[33] As a result, 21 percent of Tunisian households in 2005 and 39 percent Tunisians in 2010 would be considered economically secure using the Lopez-Calva and Ortiz-Juarez (2014) definition.

4.3 Vulnerability to Poverty as "Poverty Mobility"

Thus far, the analysis of vulnerability to poverty has been analyzed from a static point of view, that is, in a given year. But vulnerability to poverty has an intrinsic dynamic sense, capturing today's expectation of future poverty in the face of risks. This dynamic sense intrinsically entails a notion of mobility, that is, nonpoor households falling into poverty over time and, the other side of the coin, poor households escaping poverty over time. Interestingly, by looking at *any* type of mobility across poverty status—and not only mobility *out of* poverty—an analysis of mobility assesses the role that certain determinants have in *changing* poverty, that is, how a factor like education can affect the chances of a household to move out of poverty, but also into poverty.[34] Based on Field's (2005) notion of time dependence, a society is

[33] The threshold to be above the vulnerable categorization was US$260 2005 PPP of monthly household per capita consumption in 2005, and US$216 2005 PPP in 2010.
[34] Ultimately, this analysis assesses the more comprehensive question of how "mobile" a society is in terms of poverty and not just how today's nonpoor may fall into poverty tomorrow.

deemed mobile in terms of poverty over time if one's initial position does not bear relevance in determining his or her future poverty status in society.[35]

Box 5 describes in detail the methodology used to capture poverty mobility in Tunisia. The data for this analysis comes from the 2005 and 2010 ENBCV rounds.[36] Using the demographic and economic data available, cohorts of individuals defined by age and gender are created and tracked between 2005 and 2010. Some 23 age groups are first created in the ENBCV 2005, delimited by three-year bins starting with individuals aged 15 and 17 years old, followed with those between 18–20 years old, with a final bin of those aged 81 years and older. Each of these cohorts are then further disaggregated by gender, thus obtaining a final set of 46 cohorts in 2005 that will be followed in 2010.

Each cohort has its own characteristics in terms of sociodemographics, labor conditions, and a wealth index (which now combines assets ownership and dwelling characteristics, such as being connected to the public electrical network and having tap water available inside). Thus, for example, each cohort has an average age of the head of the household to which each member of the cohort belongs; a percentage of members residing in urban areas; and a share of members working in agriculture, to name a few. Averages and percentages of all these determinants are obtained for each cohort and year using the reported sampling weights of each survey.[37] To estimate equations (4) and (5) in box 5 that capture poverty mobility, the consumption per capita variable is converted into 2005 PPP to take into account changes in prices that may affect the observed level of consumption.

Box 5. Capturing Poverty Mobility

The starting point of poverty mobility analysis is the measure of income or consumption mobility, as defined by Lillard and Willis (1978), where the relationship between past and present income/consumption was established as follows:

$$y_{i,t} = \beta y_{i,t-1} + \epsilon_{i,t} \quad (1)$$

where $y_{i,t}$ is the total income/consumption for household *I* at time *t*, $\epsilon_{i,t}$ is a disturbance term, and parameter β, the coefficient of the slope in a regression of the income over its lagged value, is the measure of mobility. A value of βequal to 1 represents a situation where previous (or initial) income/consumption completely determines current income/consumption, and current income perfectly predicts the income expected in the future. This is a situation of where there is no income mobility. An extreme case is β = 0, in which mobility would be total (as there would be no relationship between past and present incomes). The mobility estimator obtained from (1) is called *unconditional* in the sense that it does not take into account the presence of covariates (other than past income) that may explain present income. When the estimation is performed with additional controls, we have the *time-dependence conditional* estimation of mobility:

$$y_{i,t} = \beta y_{i,t-1} + \delta X_{i,t-1} + \mu_{i,t} \quad (2)$$

where *X* is a vector of covariates and δ is intended to measure the impact of those covariates on income. However, the implementation of (2) requires the ability to follow individuals (or households) over time, with the direct implication of a need

[35] A more detailed description of these and other mobility measures can be found in Fields (2005) and Ferreira et al. (2013). Other notions of mobility refer to individuals' changes in economic positions; changes in individuals' shares of incomes; income flux or size of the fluctuations in individuals' incomes, but not their sign; how many people move up or down and by how many dollars; and mobility as an equalizer of longer-term incomes that is, a comparison of the inequality of income at one point in time with the inequality of income over a longer period.

[36] Note that this analysis is based on the actual incidence of poverty as found in the ENBCV. We are precluded to extend this analysis to the 2012 ENPE as the predicted incidences would have come from a prediction itself rather than observables. In practice, the assumption of no change in the coefficients of the estimated consumption model in 2010 when predicting 2012 consumption or the assumption of identical error terms in both years determine the predicted poverty rates in 2012. This would, by construction, minimize the change in poverty observed between 2010 and 2012. While this lower bound estimate is useful to inform the order of magnitude and direction of post-revolution poverty change, it may not be fully appropriate to be used in poverty dynamics analysis.

[37] Appendix 5 presents the basic descriptive statistics of sociodemographics, labor, access to services, and asset ownership features that characterize the "synthetic" household heads of the constructed pseudo-panel cohorts.

for longitudinal data. Unfortunately, in the Tunisian case, such panel data are not available. To investigate mobility, analysis must rely on pseudo-panel techniques (Deaton 1995) and create synthetic observations (called *cohorts*) obtained from averaging real observations with similar characteristics in a sequence of repeated cross-sectional data sets. That is, individuals are grouped according to certain characteristics (age and gender) that define them over time, and then the average of their characteristics within each group are used. Since groupings are based on characteristics that can be tracked, the synthetic units of observations can be "followed" over time. The estimation equation can be modified then to:

$$\bar{y}_{c(t),t} = \beta_c \bar{y}_{c(t-1),t-1} + \delta_c \bar{X}_{c(t-1),t-1} + \mu_{c(t),t} \quad (3)$$

where the individual index, *I*, has been replaced by a cohort index, $c_{(t)}$, that is time-dependent. Analogously to equation (1), the slope β_c is the parameter of interest.

This analysis is complemented by examining not only the mobility of consumption, estimator β, but also changes in the poverty incidence for the pseudo-panel observations. For that purpose, for each cohort the percentage of individuals whose income is below a poverty threshold is computed, and then, denoting that percentage by *p*, the extent to which this change is related to initial levels of poverty can be estimated. That is:

$$\Delta p_{c(t),t} = \theta_c p_{c(t-1),t-1} + \varepsilon_{c(t),t} \quad (4)$$

As with the unconditional and conditional version of the mobility equation, this equation can be expanded (4) to account for other possible determinants of the evolution of poverty, as found in other studies. Thus, the estimate:

$$\Delta p_{c(t),t} = \theta_c p_{c(t-1),t-1} + \gamma_c \bar{X}_{c(t-1),t-1} + \varepsilon_{c(t),t} \quad (5)$$

Results from this equation will inform how certain covariates in a past time determine the probability of a given individual and household to remain in, fall into, or escape from poverty in a subsequent period.

Source: Cuesta, Nopo, and Pizzolito (2011).

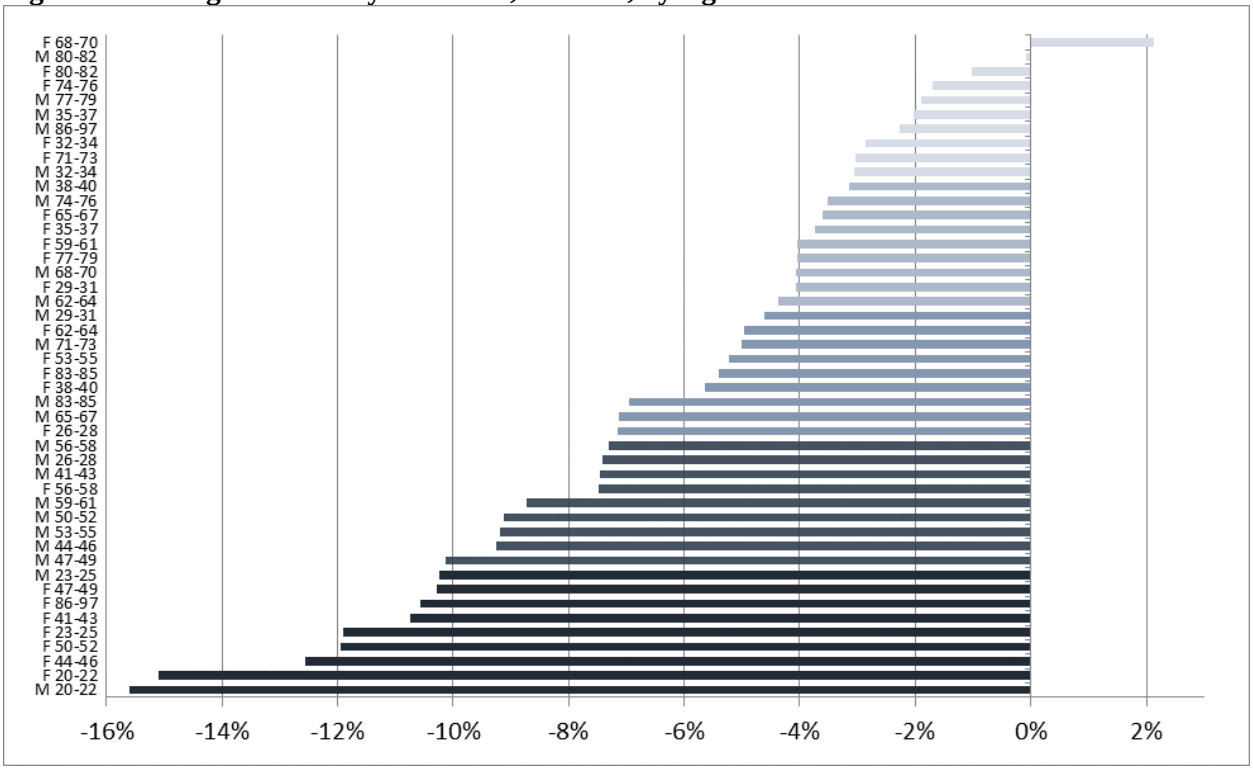
All cohorts experienced a decrease in poverty between the years 2005 and 2010, with only one exception, the cohort of females aged 63–65 in 2005 (figure 12). Cohorts experienced a drop in poverty incidence that ranges from almost 16 percentage points to a mere 0.1 percentage point, with wide variation among cohorts. Yet, more than half of the cohorts registered a drop of at least 5 percentage points between both years. **This confirms that the *observed* reduction of poverty between 2005 and 2010—of 8 percentage points—is the result of a generalized improvement in poverty conditions across the population, with a large share benefiting from sizeable—average—reductions.**

What is behind those reductions in poverty across cohorts? To answer this question, the analysis focuses on the indicator that captures changes in poverty incidence within cohorts over time. Poverty rates are defined according to the poverty line relevant for each strata where a household resides (city, medium-sized towns, and noncommunal areas). Poverty rates are averaged within cohorts using sampling weights. Thus, for each synthetic observation in each year, the percentage of individuals that have an average per capita consumption below the poverty cutoff is calculated. Based on that estimate of poverty within a cohort, the change in poverty over time results from subtracting each cohort's poverty rate in 2005 from the cohort's poverty rate in 2010.[38] These cohorts' poverty changes are then regressed on the key determinants of mobility described in box 5. Table 11 reports the results of the estimation of equation (4) in column 1—unconditional poverty mobility—and of several specifications of equation (5) in columns 2–5, capturing poverty mobility conditional to several determinants. Column 2 includes controls for

[38] That difference constitutes the left-hand side of equations (4) and (5) described in box 5.

sociodemographic, wealth and access to services, while columns 3–6 add controls for labor market characteristics.

Figure 12. Changes in Poverty Incidence, 2005–10, by Age and Gender Cohorts

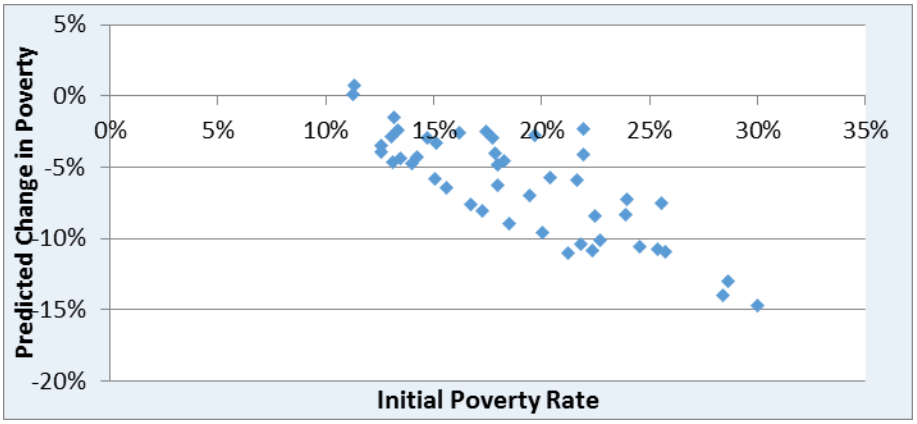


Source: World Bank staff's calculations using ENBCV 2005 and 2010.
Notes: Male and female cohorts are labeled "M" and "F" respectively. The age shown corresponds to their corresponding age in 2010. For example, "M 20–22" refers to the cohort of males who were born between 1990 and 1992 and therefore age 20 to 22 in 2010.

The initial level of a cohort's poverty is a significant determinant in the expected change of poverty over time. **Cohorts with higher poverty rates in 2005 experienced larger drops in poverty between 2005 and 2010 than cohorts with lower poverty levels. This result is in line with previous results suggesting that poorer population groups experienced large improvements in welfare** (see chapter 2)**—though large differences still remain.** Figure 12 illustrates this finding: the *predicted* change in poverty between 2005 and 2010 for each of the 46 cohorts increases with initial levels of poverty in 2005.

This result holds across different specifications modeling poverty mobility (table 12). Column 1 in table 12—unconditional poverty mobility—points to a statistically significant effect of initial poverty in 2005 in explaining poverty reductions between that year and 2010. Columns 2–6 also consistently confirm that effect as other determinants are gradually controlled for. Interestingly, the estimated coefficient for initial poverty varies relatively little across specifications (from -0.531 to -0.649), and only two other determinants are found significant once initial poverty is controlled for: the average age of the household head and the percentage of individuals whose household head had primary studies.

Figure 13. Predicted Change in Poverty between 2005 and 2010 by Initial Poverty Rates of Pseudo-Panel Cohorts



Source: World Bank staff's calculations using ENBCV 2005 and 2010.
Note: Each observation represents an age/gender cohort. Initial poverty rates refer to 2005. Predicted change in poverty obtained from regressions results of Table 10column 3.

Cohorts of individuals living in households with older heads experienced, on average, larger drops in their poverty rates between 2005 and 2010. Education seems to have an impact as well, but only among relatively lower levels of education: cohorts with a higher concentration of individuals in households whose head attended only primary school also experienced, on average, larger decreases in poverty rates. This appears consistent with the country's economic growth model based on low skills dominating Tunisian development, as discussed in chapter 1. After controlling for demographics and initial poverty, other characteristics such as location, wealth, and labor market are not found statistically significant determinants of poverty mobility. This does not mean that these determinants are not relevant in explaining poverty levels in Tunisia. Instead, when cohorts have similar average poverty rates and demographic characteristics, differences in labor market status or wealth do not create by themselves significant differences in their capacity to reduce poverty over time. However, other labor variables not considered here—due to lack of data—such as changes in wages, earnings, job quality, and productivity may matter for poverty reduction over time for these cohorts. Also, productive assets rather than consumption assets may have more of an impact in explaining poverty reduction trends, which may explain the lack of significant effects found among assets in these poverty mobility equations.

Table 10. Determinants of Changes in Poverty Incidence in Tunisia

	Dependent variable: Change in poverty rate					
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Poverty rate	-0.611***	-0.618***	-0.621***	-0.531***	-0.649***	-0.618***
	(0.078)	(0.128)	(0.143)	(0.134)	(0.136)	(0.138)
Percentage living in rural areas		0.157	0.101	0.226	0.079	-0.008
		(0.146)	(0.155)	(0.148)	(0.158)	(0.159)
Percentage living in coastal areas		0.197	0.203	0.184	0.245	0.262*
		(0.155)	(0.153)	(0.154)	(0.160)	(0.152)
Average household head age		-0.024***	-0.027***	-0.016*	-0.022***	-0.018**
		(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
Average household head age squared		0.000***	0.000***	0.000	0.000**	0.000*
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Percentage whose heads have only *primary* studies		-0.264***	-0.263***	-0.233*	-0.262***	-0.072
		(0.088)	(0.088)	(0.130)	(0.090)	(0.136)

Percentage whose heads have studies of *secondary* or above		0.055	0.063	0.030	0.078	0.178
		(0.071)	(0.075)	(0.147)	(0.076)	(0.159)
Wealth index score		-0.025	-0.022	-0.007	-0.057	-0.073
		(0.037)	(0.041)	(0.038)	(0.043)	(0.046)
Percentage of households with a male household head		-0.034	-0.045	0.026	0.012	0.085
		(0.043)	(0.052)	(0.052)	(0.053)	(0.072)
Percentage of individuals working in agriculture[a]			0.007			0.141*
			(0.040)			(0.070)
Percentage of individuals working in industry[a]			0.051			0.176***
			(0.035)			(0.062)
Percentage with self-employed household heads				-0.356*		-0.349*
				(0.187)		(0.197)
Percentage whose heads are wage workers				-0.004		-0.092
				(0.104)		(0.106)
Percentage of individuals whose occupation is an office job[a]					-0.041	0.054
					(0.048)	(0.068)
Percentage of individuals whose occupation is mid-level[a]					0.109	0.236**
					(0.075)	(0.091)
Percentage of individuals whose occupation is professional[a]					-0.084	0.050
					(0.068)	(0.079)
Constant	0.053***	0.718**	0.795***	0.494	0.616*	0.331
	(0.015)	(0.289)	(0.288)	(0.304)	(0.309)	(0.300)
Observations	46	46	46	46	46	46
R-squared	0.583	0.868	0.878	0.881	0.878	0.914

Source: Authors' calculations using the ENBC 2005 and 2010.
Notes: Standard errors in parenthesis. The wealth index score is obtained from the first component of a principal component analysis of household assets and dwelling characteristics. All regressors are calculated using 2005 data.
a. Percentages calculated among individuals who are working at the time of the survey. *** p<0.01, ** p<0.05, * p<0.1

The analysis of *consumption* mobility (reported in appendix 5) confirms by and large the key findings of poverty mobility in terms of the extent of mobility and its significant determinants. In conclusion, it can be argued that **vulnerability to poverty—from a dynamic perspective—has decreased in Tunisia, consistent with evidence discussed earlier. Most cohorts saw their poverty incidence decline between 2005 and 2010, including those with initially higher levels of poverty. Thus poverty reduction has been a generalized trend that did not exclude the poorest cohorts of population.** Initial poverty conditions and education and age of household head are found to be the most significant determinants of poverty reduction in Tunisia, while labor conditions and wealth did not provide additional contributions to reduce poverty—other than their effect on the starting level of poverty.

Chapter 5: Is Tunisia an Equal Opportunities Society?

5.1 To What Extent Does Tunisia Offer Equal Opportunities to Its Citizens?

The analysis of vulnerability so far has been anchored in the notion of monetary poverty, that is, how and why households are vulnerable to fall into monetary poverty, remain poor, or change their poverty status. Yet those approaches do not go beyond monetary metrics of poverty and therefore miss nonmonetary dimensions of welfare. How can the concepts of vulnerability and poverty be linked from a multi-dimensional perspective?

Equality of opportunities provides a promising extension to the traditional focus on monetary poverty (Roemer 1998; Molinas et al. 2010; Cuesta 2014). The framework is based on two basic concepts: opportunities and circumstances. Opportunities are the goods and services that a society agrees are critical for a decent life and individual development. Hence, universal access to such opportunities is a desired goal that is commonly accepted. Primary education, adequate access to water and sanitation, or timely and affordable health care are examples of opportunities. Circumstances are the attributes of an individual's environment (social, genetic, or biological) with which he or she is born into. Those attributes are considered beyond the control of the individual, and society does not regard him or her responsible for such traits. Circumstances typically include gender, age, parental background, and ethnicity. Equality of opportunities prevails when an opportunity can be achieved with the same level of effort irrespective of an individual's circumstances. That is, under equality of opportunities, circumstances do not affect the access to key goods and services that are necessary for enjoying a decent life.

The Human Opportunity Index (HOI; Paes de Barros et al. 2008) is one of the most commonly used analytical tools to measure equality of opportunities. The HOI synthesizes in a single indicator how close a society is to universal coverage of a given opportunity *and* how equitably coverage of that opportunity is distributed. Simply put, the HOI is a measure of coverage of a good or service that takes into account the degree of access inequality among citizens. The HOI "penalizes" the extent to which different circumstance groups—that is, population groups defined by certain circumstances—have different coverage rates of a given opportunity. When coverage rates among multiple circumstance groups are equal, the penalty is zero and the HOI is equal to the opportunity's overall coverage rate. As coverage rates differ among circumstance groups, the penalty increases and the HOI decreases. Higher inequality in coverage rates leads to lower HOI. Box 6 provides a more technical representation of the HOI construct, while table 11 presents the opportunities and circumstances used in the analysis for Tunisia.

Box 6. Constructing the HOI

According to Molinas et al. (2010), Paes de Barros et al. (2008) and Narayan and Hoyos (2012), from which this box draws, constructing the HOI requires to estimate the conditional probabilities of access to opportunities for each child based on his or her circumstances. A simple way to do so is to fit a logistic model, linear in the parameters β, where event I corresponds to accessing the opportunity (for example, access to clean water), and x the set of circumstances (for example, gender of the child, education, gender of the head of the household, and the like) on household survey data. One can fit the logistic regression using survey data:

$$Ln\left(\frac{P[I=1|X=(x_1,\ldots,x_m)]}{1-P[I=1|X=(x_1,\ldots,x_m)]}\right)=\sum_{k=1}^{m}x_k\beta_k.$$

where x_k denotes the row vector of variables representing the *k* dimension of circumstances, hence, x = (x_1, ..., x_m) and β' = (b_1, ..., b_m), a corresponding column vector of parameters. From the estimation of this logistic regression from a household survey data, one obtains estimates of the parameters {β_k}, denoted by "^" while *n* denotes the sample size. Given the estimated coefficients, one can obtain for each individual in the sample his or her predicted probability of access to a given opportunity as:

$$\hat{p}_{i,n} = \frac{Exp(x_i\hat{\beta}_n)}{1 + Exp(x_i\hat{\beta}_n)}.$$

Finally, from these estimates, the overall coverage rate, *C*, can be computed, as well as the D-index, the penalty, *P*, and the HOI, using the predicted probability *p*^ and sampling weights, *w*, from the household survey data used as:

$$C = \sum_{i=1}^{n} w_i \hat{p}_{i,n} \quad D = \frac{1}{2C}\sum_{i=1}^{n} w_i |\hat{p}_{i,n} - C|$$

$$P = C * D; \quad \text{and} \quad HOI = C - P.$$

D, or the dissimilarity index, is typically interpreted as a share of the total number of opportunities that needs to be reallocated among all groups of the population with different circumstances to ensure equality of opportunity, that is, an equal coverage rate for all groups. *D* is commonly referred as the inequality of opportunity index. When this similarity index is combined with coverage, the resulting figure indicates the penalty that should be imposed to the observed coverage rate to inequality among population groups. The HOI is the adjusted coverage rate after that inequality-based penalty is subtracted.

Decomposition methods can be used to determine the contribution to each circumstance, *x*, to the total intergroup inequality, that is, to the D-Index. One of the most recently used decomposition methods is Shorrocks (2013). This methodology develops a decomposition based on Shapleys original game theory work. The proposed decomposition allows us to quantify the role of each circumstance as its marginal contribution to the D-Index. For a given set of circumstances, the "contribution" of an additional circumstance to the index can be interpreted as the marginal change in the value of the D-Index after adding the "new" circumstance. Circumstances that add more to the D-Index are then considered as contributing to (or explaining) a larger share of the inequality between groups, the contribution of a circumstance to the D-Index is estimated as the average addition to the value of the D-Index of that circumstance over all the possible permutations in which all considered circumstances can be combined.[a]

Source: Molinas et al. (2010); Paes de Barros et al. (2008); Narayan and Hoyos (2012).
a. World Bank (2015e) provides a more technical discussion of this methodology.

Table 11. Definition of Opportunities and Circumstances for Equal Opportunities Analysis in Tunisia

Opportunities	Description	ENBCV 2005	ENBCV 2010
Education			
Attending school (age 10–14)	Child aged 10–14 is currently attending school	√	√
Started school on time (6–7)	Child is attending school by age 6 or 7	√	√
Finished six years of education (12–16)	Individual has completed six years of education (within the ages of 12 and 16)	√	√
Housing (water and sanitation)			
Access to water (water piped to premises) (0–16)	Individual age 0 to 16 pertains to a household that has tap water in dwelling	√	√
Access to flushing toilet (0–16)	Individual age 0 to 16 pertains to a household that has a flushing toilet indoors	√	√
Dwelling with flush toilet to piped sewer	Individual age 0 to 16 pertains to a household that has a flush toilet connected to a piped sewer	√	√
Access to sanitation (0–16)	Individual age 0 to 16 pertains to a household that is connected to the sanitation network	√	√
Circumstances	Description	ENBCV 2005	ENBCV 2010
Quintiles of consumption	Quintiles based on the households' consumption per capita; consumption measure includes food, habitation costs, clothing, hygiene, transportation, education, communication, leisure, taxes, investments, durable goods, and more.	√	√
Gender	Gender of the child: male (=1); female (=0)	√	√
Family characteristics	Age of household head; presence and number of members age 0–15; presence and number of elderly members in the household	√	√
Household head education	Household head highest educational level attended (none, primary, secondary, tertiary)	√	√
Head working sector	Household head has a job in the public sector (=1) or otherwise (=0)	√	√
Head is single parent	There is no spouse present in the household (=1) or spouse of the household head is present (=0)	√	√
Type of village	Location of the household is rural (=1) or urban (=0).	√	√
Region	Regional location of the household: Grand Tunis, northeast, northwest, center east, center west, southeast, and southwest	√	√

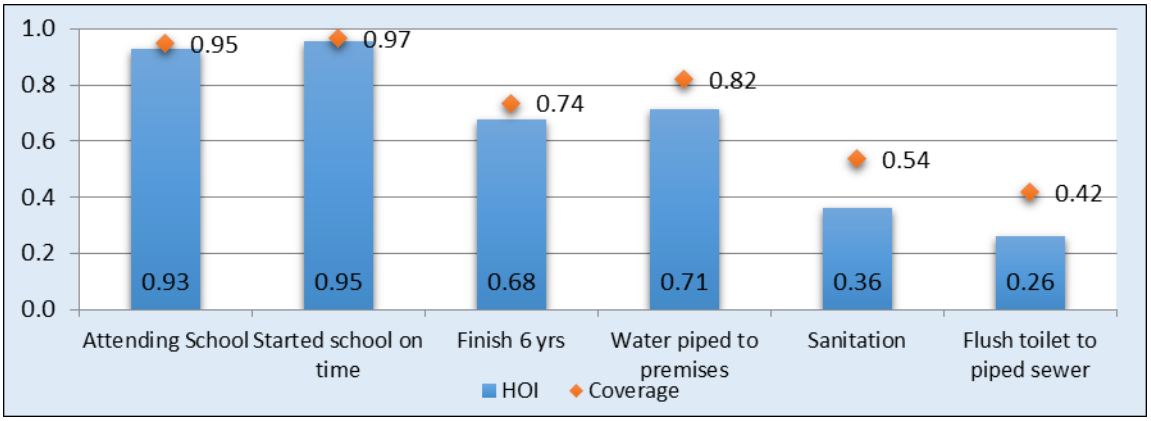
Source: World Bank staff.

Figure 14 presents both the observed coverage rate and the estimated HOI for education-, water-, and sanitation-related opportunities among Tunisian children. In 2010, educational opportunities such as attending school and starting school on time are almost universal in Tunisia. Their access rates among children of the specific age exceed 90 percent. These opportunities, therefore, do not bear much of a distributional penalty, and the coverage rate and the HOI are very similar. However, completing six years of education and having access to tap water both have lower coverage than the previous opportunities, between 70 percent and 80 percent coverage rates, respectively. Unsurprisingly, the access to these opportunities is not uniformly distributed across different population groups defined by the circumstances accounted for in table 13. As a result, their HOI is lower than the observed coverage. In fact, in the case of access to tap water, the gap between coverage and HOI is about 10 percentage points. This gap constitutes the "penalty" to the observed coverage to tap water access due to the unequal access among population groups. Finally, the last two opportunities considered, access to sanitation and presence of a flushing toilet in the household, both have the lowest coverage and the largest inequality of access across population groups. In other words, not only do fewer Tunisian children have access to such services, but there are large inequalities in coverage across different population groups. About 53 percent of households have access to sanitation and 41 percent to flush toiled connected to a piped sewer. As penalties for inequality among population groups are considered in the HOI measurement, HOI rates decline to 36 and 26 percent, respectively.

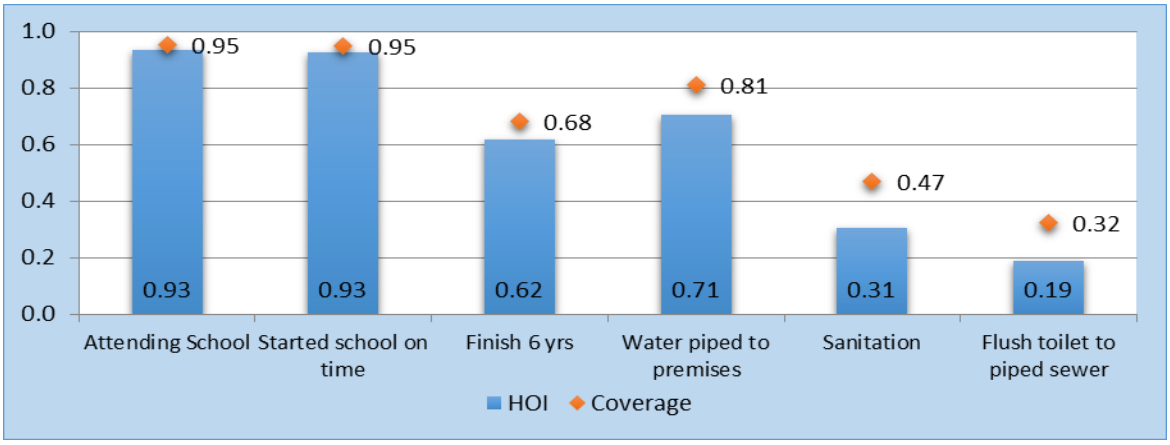
Looking at the changes across time (figure 14), it is clear that most opportunities experienced an improvement between 2005 and 2010. The share of children finishing six years of education on time increased from 68 to 74 percent; access to sanitation went from 47 to 54 percent; and the proportion of children living in dwellings with a flush toilet connected to a piped sewer increased 10 percentage points to 42 percent in 2010. Unfortunately, the equity among the children with access to these opportunities improved at much lower rates. The HOI for finishing primary school on time increased a mere 6 percentage points, for sanitation the change was 5, while access to a flush toilet improved by 7 percentage points. Other opportunities such as attending school, starting school on time, or having water piped to premises were practically the same between 2005 and 2010, given that they were almost universal services in 2005.

Figure 14. Coverage and Human Opportunities Index for Education, Water, and Sanitation Opportunities in Tunisia

2010



2005



Source: World Bank staff estimates from ENBCV 2005 and 2010.
Note: Circumstances include gender of child; age, education, and working condition of household head; demographics of the household; presence of spouse of household head in the household; consumption of household; type of village; and region of residence. Relative weights are calculated from a Shapley decomposition methodology. This methodology measures the contribution of each variable to the total intergroup inequality of coverage of a given opportunity. "yrs" stands for years.

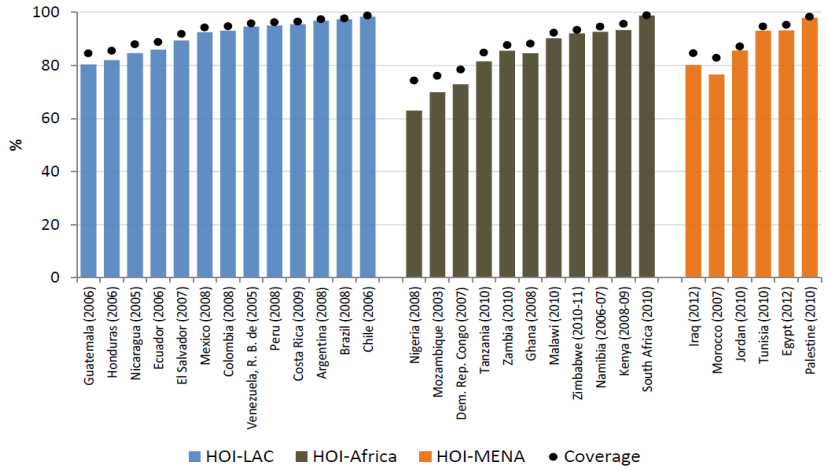
These results conclude that circumstances do still matter in Tunisia and affect the chances of children to access key basic services. Unequal opportunities are observed in Tunisia, although to different extents depending on the opportunity considered. While inequality of opportunities is hardly present when it comes to attending school or start school on time, it matters for education attainment and access to water and becomes notorious for sanitation and flush toilets. World Bank (2015e)—not shown here–confirms this conclusion: gaps between HOI and observed rates persist for education opportunities that capture *quality* aspects beyond access—such as children's proficiency in math and reading measured by PISA test results.

Tunisia's record of equal opportunities pre-revolution (2010) is similar to its closest neighbors in the region. In terms of school attendance, its coverage and HOI is comparable to the Arab Republic of Egypt (2012) and Palestine (2010), and superior to Jordan (2010), Morocco (2007), and Iraq (2012)—three countries with lower coverage rates and larger inequality-related penalties than Tunisia (figure 14). When it comes to water, Tunisia's unequal opportunities in access are worse than Egypt and Palestine, and only better than Jordan and Morocco. Moreover, along with Morocco, Tunisia has the largest inequality-based penalty on water access coverage in the region. This underwhelming opportunity record is also observed for sanitation—its coverage rate is far from the best in the region (Egypt and Palestine), and the gap between its observed coverage and HOI is the largest in the region, along with Morocco.

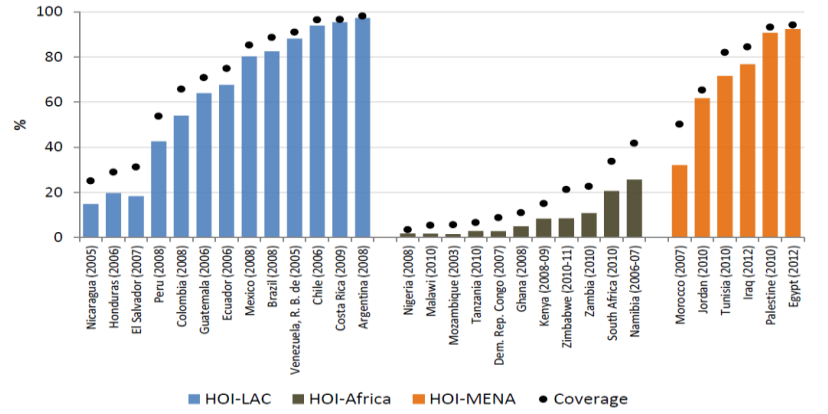
In conclusion, Tunisia's record of unequal opportunities lags behind the best performers in the Middle East and North Africa for those key basic services that are far from universally distributed. Interestingly, compared to other regions in the world, Tunisia's record of equality of opportunities aligns more closely with the top Latin American and African performers when it comes to school attendance (whose access is close to universal). Moreover, Tunisia's performance is systematically better than most African countries and comparable with the average Latin American performer, both in terms of access to water and sanitation (figure 14). Thus, significant improvements in equal opportunities in water and sanitation opportunities are needed before Tunisia's record of coverage and equal opportunities in access become comparable with the best among the developing world.

Figure 14. Inequality of Opportunities in Tunisia: An International Perspective

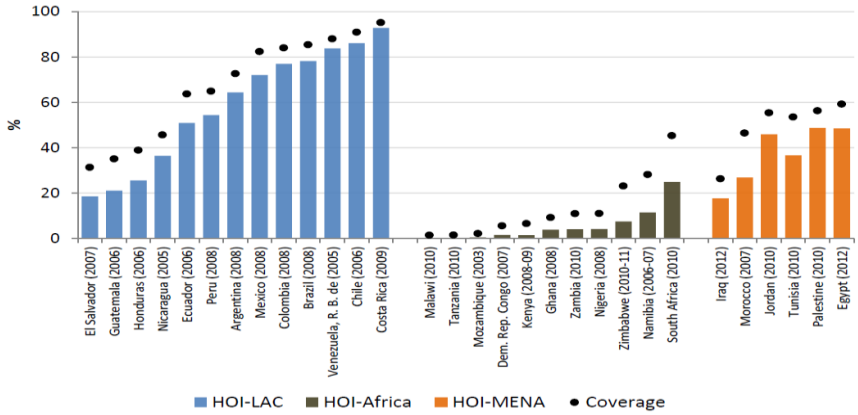
School Attendance



Access to Water



Access to Sanitation



Source: World Bank (2015f).

Note: School attendance is restricted to children ages 10–14, access to water refers to children ages 0–16 living in a dwelling with tap water, and access to sanitation refers to dwellings connected to the public sewage network. To improve comparability, the circumstances included in this analysis are gender, location, number of children ages 0–16 in the household, education of household head, and whether there is a single parent.

5.2 What Drives Inequality of Opportunities in Tunisia?

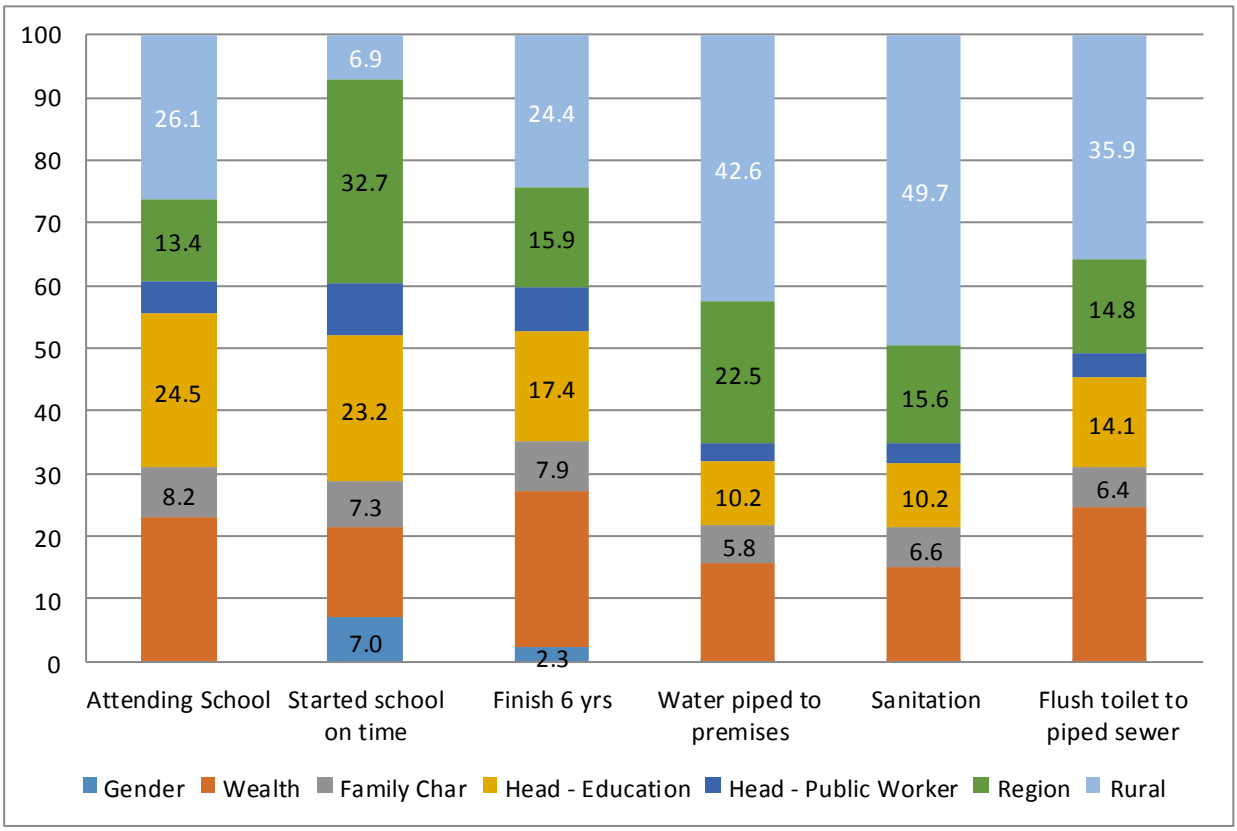
If Tunisians enjoyed equal opportunities, specific circumstances—such as gender, socioeconomic background, or residence—would not explain any gaps in access to basic services on education, water, and sanitation. But, as shown above, such circumstances *do* still matter in Tunisia. Interestingly, the HOI approach is able to identify the most relevant circumstances explaining access disparities and quantifies its relative contribution to unequal access (box 6). This section presents both the observed coverage rate and the estimated HOI for education-, water-, and sanitation-related opportunities among Tunisian children. In 2010, educational opportunities such as attending school and starting school on time are almost universal in Tunisia. Their access rates among children of the specific age exceed 90 percent. These opportunities, therefore, do not bear much of a distributional penalty, and the coverage rate and the HOI are very similar. However, completing six years of education and having access to tap water both have lower coverage than the previous opportunities, between 70 percent and 80 percent coverage rates, respectively. Unsurprisingly, the access to these opportunities is not uniformly distributed across different population groups defined by the circumstances accounted for in table 13. As a result, their HOI is lower than the observed coverage. In fact, in the case of access to tap water, the gap between coverage and HOI is about 10 percentage points. This gap constitutes the "penalty" to the observed coverage to tap water access due to the unequal access among population groups. Finally, the last two opportunities considered, access to sanitation and presence of a flushing toilet in the household, both have the lowest coverage and the largest inequality of access across population groups. In other words, not only do fewer Tunisian children have access to such services, but there are large inequalities in coverage across different population groups. About 53 percent of households have access to sanitation and 41 percent to flush toiled connected to a piped sewer. As penalties for inequality among population groups are considered in the HOI measurement, HOI rates decline to 36 and 26 percent, respectively.

Looking at the changes across time (figure 14), it is clear that most opportunities experienced an improvement between 2005 and 2010. The share of children finishing six years of education on time increased from 68 to 74 percent; access to sanitation went from 47 to 54 percent; and the proportion of children living in dwellings with a flush toilet connected to a piped sewer increased 10 percentage points to 42 percent in 2010. Unfortunately, the equity among the children with access to these opportunities improved at much lower rates. The HOI for finishing primary school on time increased a mere 6 percentage points, for sanitation the change was 5, while access to a flush toilet improved by 7 percentage points. Other opportunities such as attending school, starting school on time, or having water piped to premises were practically the same between 2005 and 2010, given that they were almost universal services in 2005.

Figure 15 presents the relative weight of all the circumstances considered in the analysis of Tunisian opportunities. Relative weights capturing the contribution of each circumstance to the intergroup inequality are calculated using a Shapley decomposition methodology for each opportunity analyzed. Results confirm that, robust to the choice of opportunities analyzed, education of the household head,

urban/rural location and regional residence, and wealth are systematically the most relevant circumstances to explain unequal opportunities in Tunisia. Combined, they account for between 75 and 90 percent of the total differences in coverage of multiple opportunities across population groups.

Figure 15. Relative Contribution of Circumstances to Unequal Opportunities in Tunisia (as percent of the total inequality among population groups)



Source: World Bank staff estimates from ENBCV 2010.
Note: Circumstances include gender of child; age, education, and working condition of household head; demographics of the household; presence of spouse of household head in the household; household's assets; type of village; and region of residence. Relative weights are calculated from a Shapley decomposition methodology. "Family Char.", refers to family characteristics; "yrs" stands for years.

5.3 Inequality of Opportunities and Poverty in Tunisia

Using the information on the most salient circumstances to explain access gaps among Tunisians (for all the opportunities considered), the entire population is divided into circumstances groups that can be tracked over time. These groups are used as a pseudo-panel to analyze how opportunities, poverty, and employment evolved between 2005, 2010, and 2012. Note that it is not manageable to use all 10 circumstances to generate population groups as, even with a conservative use of categories within each circumstance, more than 26,000 population groups would result from combining each possible category of each circumstance.[39] Furthermore, household wealth was omitted from the initial choice of key

[39] In effect, combining two possible groups for gender (male vs female), two categories for number of children; five quintiles of wealth; seven regions; three age groups for household head; two categories for elderly presence; whether

circumstances that will define the population groups of this analysis. In effect, adults' decisions have a direct bearing on wealth levels, so individuals can be held accountable to some extent for their observed levels of wealth. Instead, the economic status of the household is approximated by the level of education of the household head. Circumstances are also based on the gender and age of the household head, the urban/rural location, and region of residence. By combining the different categories of each selected circumstance (for example, male and female categories for gender; and Grand Tunis, western, and eastern Tunisia for regions), some 108 circumstance groups are generated. It is upon these 108 groups that the joint analysis of opportunities and poverty and then, poverty, opportunities, and labor are conducted.

The incidence of poverty is estimated for each of the 108 groups for 2005, 2010, and 2012 as the share of individuals in each group that are defined as poor within each year analyzed. Appendix 6 reports the poverty rates for each of the 108 population groups generated and ranks them accordingly. Figure 16, however, limits the analysis to the top 10 most disadvantageous population groups and the top 10 most advantageous groups. The latter are the 10 population groups with a set of circumstances that make them more prone to poverty among the 108 population groups constructed in Tunisia. For example, the most disadvantageous group is composed of female individuals, younger than 18 years of age, who belong to households in rural areas located in western regions and where the household head has at least primary education. Individuals in this group had, in 2005, an average poverty incidence of 57 percent. The most advantageous group, in contrast, refers to males over 60 years of age, with at least a secondary education and residing in Grand Tunis. Their observed poverty incidence was just above 3 percent. A cursory assessment indicates that most disadvantageous groups are found among young individuals residing in western regions. In contrast, most advantageous groups are typically found in households where the household head has secondary or higher education and resides in Grand Tunis.

This evidence suggests that addressing unequal opportunities is a key component in the reduction of poverty because inequality of opportunities and poverty are closely linked in Tunisia. The 10 most disadvantageous population groups in Tunisia have a poverty incidence much higher than the country's average. For example, households in western regions headed by a young individual (male or female) with low education (under six years of schooling) are those households simultaneously less likely to access basic services and more likely to be poor. They had a poverty incidence in excess of 60 percent in 2005, almost three times higher than the country's average poverty incidence. But the **most disadvantageous population groups also benefited from the overall decline in poverty observed between 2005 and 2012.** Poverty incidence among the 10 most disadvantageous groups declined between 2005 and 2012 (figure 16, upper panel), the only exception being urban households headed by an uneducated female minor (under age18) in eastern regions. For that group, there is an increase of poverty incidence observed between 2010 and 2012. A similar message comes out from the same comparison across the most advantageous population groups. The poverty incidence for each of these groups declined, from already very low rates well below national poverty rates in 2005. Exceptions are urban households in eastern regions headed by females over 60 years of age with secondary or higher education attainment (figure 16, lower panel). **This result is consistent with the previous findings—from the analyses of growth incidence curves, cohorts, and poverty mobility in chapters 2 and 6—of a generalized reduction of poverty in Tunisia that benefited most population groups and cohorts, including the poorest in the country.**

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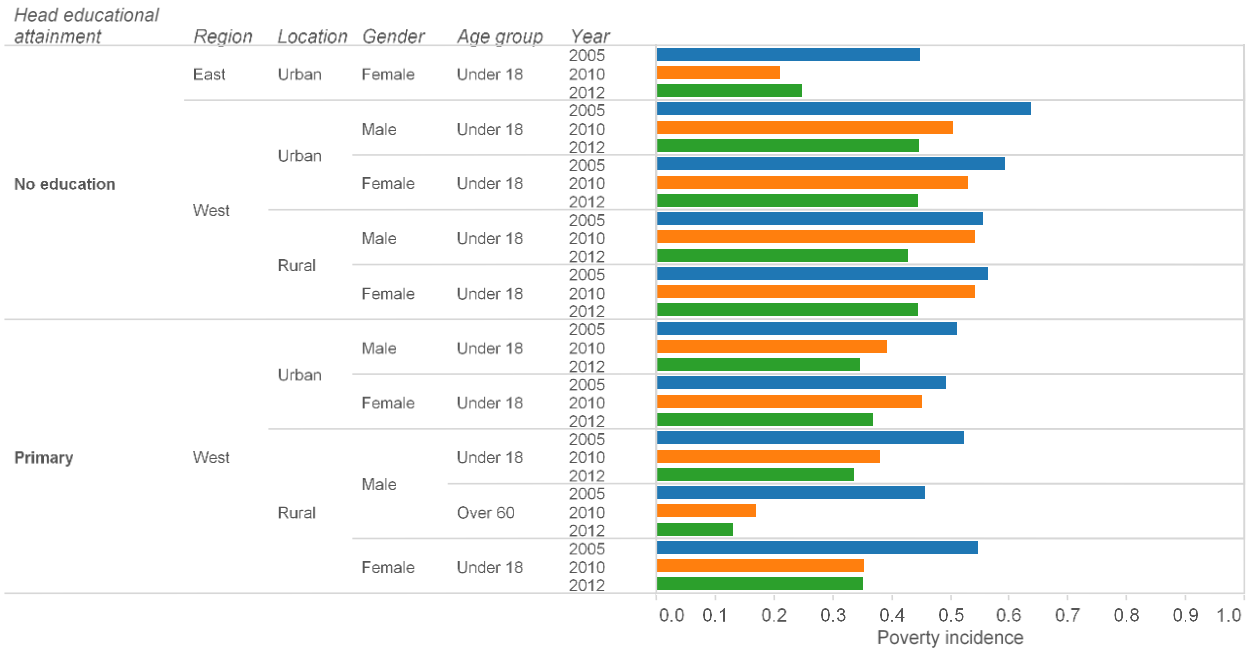
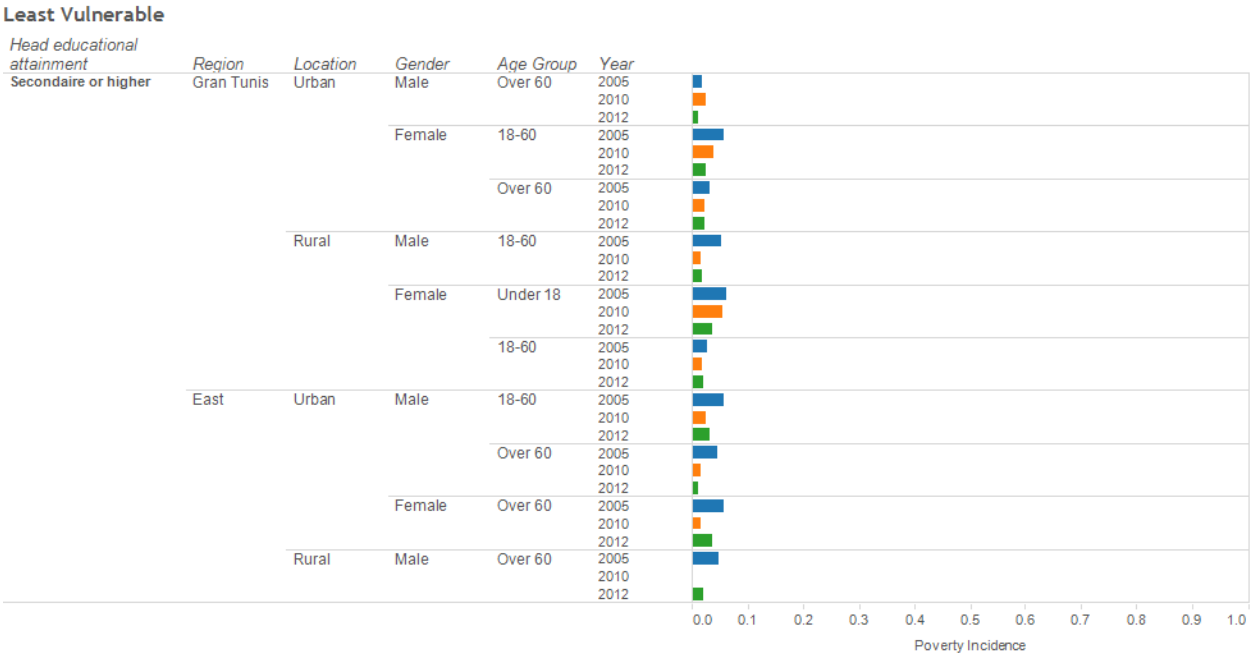
or not the household head works in the public sector; four categories of education; whether or not both parents are present and a binary variable for rural location produce 26,880 population groups.

Figure 16. Poverty Incidence among the Most Disadvantaged and Most Advantaged Population Groups in Tunisia, 2005–12





Source: World Bank staff's estimates using ENBCV 2005 and 2010, and ENPE 2012.

However, **even though the most disadvantageous groups have typically reduced their poverty incidence between 2005 and 2012, their incidence still remains substantially apart from the most advantageous population groups.** In fact this reduction has not been uniform across population groups. For example, between 2010 and 2012, poverty incidence increased for one of the most disadvantageous population groups in 2005—urban households headed by young, uneducated females in the eastern region. [40] Other disadvantaged groups, such as rural households in Western regions headed by individuals with primary education, experienced only small decreases in poverty incidence between 2010 and 2012, well below a faster reduction in poverty for that period among other groups.

5.4 Is Labor the Key Factor Behind Unequal Opportunities in Tunisia?

Tunisia exhibits marked socioeconomic differences among key labor variables such as occupation status, private versus public employment, and sector of employment (chapter 5). For instance, in all 2005, 2010 and 2012, the share of unemployment among the poor is three times higher than the share among the nonpoor. In contrast, access to a public salaried jobs among the poor is half as likely as among the nonpoor. Nonpoor workers are about five times more likely to be professionals and mid-level professionals than poor workers, and half as likely to work in agriculture as the working poor. Unambiguously, poverty and labor are closely related in Tunisia—as is the case with other determinants—but **does labor status critically affect the country's unequal opportunities?**

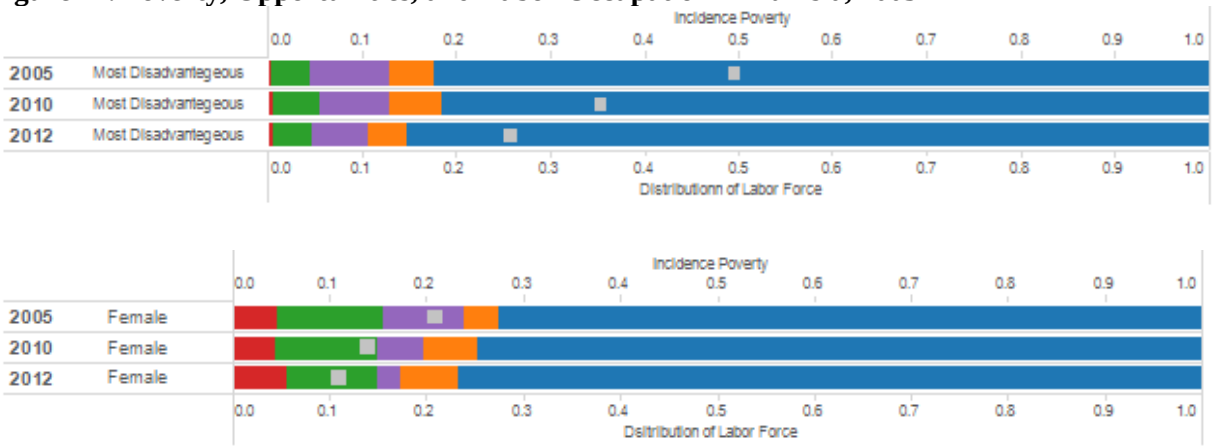
Evidence from the decomposition of the impact that circumstances have on unequal access to opportunities initially points to a limited impact. Section 7.2 concluded that education, gender, age, and location are the most important drivers of unequal opportunities in Tunisia. In contrast, the variable on the occupation of the household head did not prove to be significant once other circumstances are taken into consideration. It is worth noting that circumstances of age, gender, and education also capture experience, extent of gender discrimination and skills, all key aspects in labor markets. However, once these dimensions are controlled for, occupation status does not have much of an *additional* impact on the inequality of opportunities by itself.

This finding of a limited impact of labor circumstances on opportunities is confirmed by the fact that changes in occupation status are not much aligned with poverty trends among certain population groups between 2005 and 2012. Focusing initially on the most disadvantageous population groups, figure 17 panel a**,** shows compares the evolution of poverty and key labor conditions across vulnerability groups. It shows that changes in the poverty incidence observed among those groups do not closely correlate with changes in their occupational composition: that is, as poverty incidence declines for those disadvantaged groups, there are no marked reductions in their unemployment rates or substantive increases in their access to public or private salaried occupations. After their incidence of poverty declines, they continue to have the largest out of labor force rates and the lowest share of quality jobs—salaried in the public and private sector—among all the categories considered.

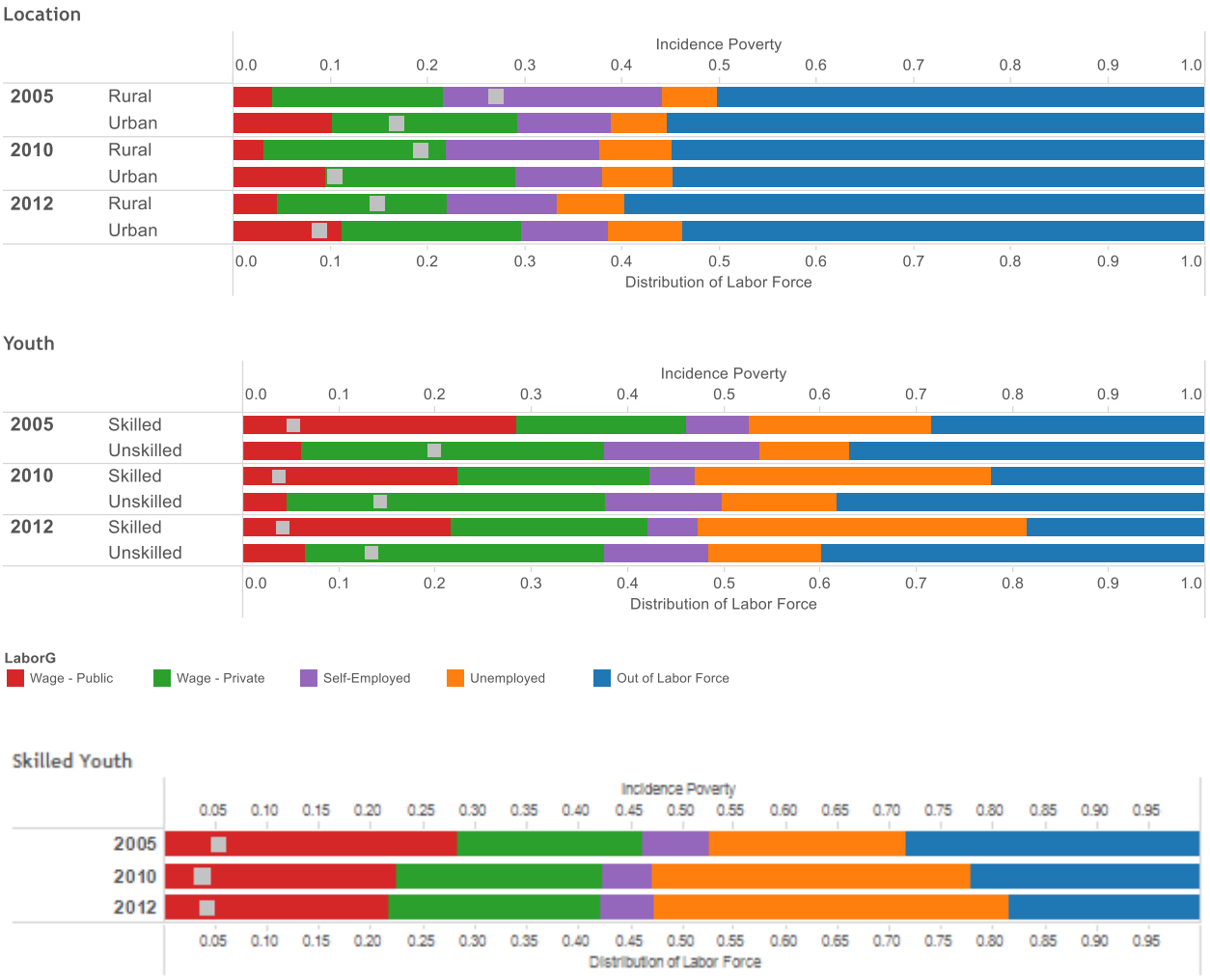
[40] There is another exception (female individuals younger than age 18, living in rural Gran Tunis in low-educated households). This group shows a sharp decline in poverty incidence. Exploratory analysis showed that this group contains a mere eight observations, therefore their estimated poverty rate should be taken with caution.

Other population groups show a similar trend of poverty reduction with little improvements in labor conditions. For example, quality jobs among females do not change much between 2005 and 2012—as the share of salaried public jobs increased and of salaried private jobs decreased—while unemployment and out of the labor force appear to increase between those years. Yet, poverty rates among females went down between both years (figure 17, panel b). The youth and, within those, the skilled youth, saw their poverty incidence slightly increase between 2010 and 2012. That increase in poverty took place without any substantive change in their occupation: neither their share of quality jobs nor the shares of unemployment and out of labor force changed perceptibly between 2010 and 2012 (figure 17, panel c). By location, the reduction in poverty among urban and rural households took also place without large changes in occupational status within each area (figure 17, panel d).[41]

Figure 17. Poverty, Opportunities, and Labor Occupation in Tunisia, 2005–12



[41] Not shown here, households pertaining to the bottom 20 percent and bottom 40 percent of the distribution did not show changes in labor occupation over these years.



Source: World Bank staff's estimates using ENBCV 2005 and 2010, and ENPE 2012.

In conclusion, labor—at least occupational status—cannot be credited as being instrumental in explaining the unequal opportunity trends observed in Tunisia. This confirms previous results on the greater relevance of education, gender, and location as determinants of unequal access to basic services rather than labor status. However, aspects of labor conditions other than occupation—say, earnings—and factors other than circumstances—such as policies—might also contribute to explain the changes behind unequal opportunities. Unfortunately, the HOI analysis does not provide an appropriate approach for a more comprehensive analysis (box 7). Expanding the current analysis to include the role of public spending and key policy decisions such as subsidies and targeting will help better understand poverty and vulnerability.

Box 7. Expanding the Analysis of Equal Opportunities to Labor

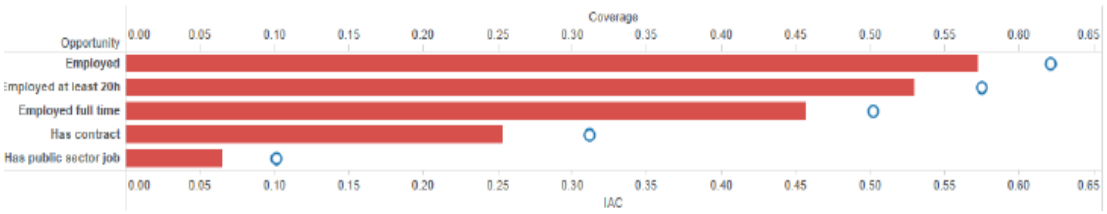
It is widely recognized that the concept of labor opportunities is less straightforward than that of opportunities related to basic services such as education, health, or water and sanitation (World Bank 2015b). First, labor opportunities need to be assessed among working-age individuals, that is, individuals who make decisions and choices and decide their effort when it comes to labor outcomes. To a large extent, they are responsible for their observed labor outcomes. Second, it is not so clear which labor opportunities constitute a desirable universal good:

for example, being employed may not be a desirable opportunity after all if the individual is employed in a precarious and dangerous job. Also, an individual may prefer an informal job over a formal job because of a personal preference for flexible labor conditions. Third, some argue that it is not a labor outcome –such as occupation– but employability, a hard to define and measure attribute, that constitutes a true labor opportunity. Fourth, in practice it is difficult to separate the role that circumstances may have in today's labor opportunities regarding their effect on earlier human capital accumulation, which critically determines today's labor outcomes. That is, separating direct and indirect effects of circumstances becomes a very complex exercise.

For these reasons, the analysis of equal opportunities on labor is still being developed. Current analyses measuring an HOI for labor (Abras et al. 2012; World Bank 2015f) acknowledge these difficulties and provide a first set of results that they characterize as tentative and preliminary. In the case of Tunisia, World Bank (2015d) uses a youth employment survey from 2012, designed and collected by the World Bank, to analyze the role of gender, father's and mother's education, region of birth (considered to be circumstances), and age and education of individuals (considered to be characteristics capturing individuals' experience and skills) to explain unequal access to several labor opportunities: being employed; employed full time; employed at least 20 hours a week; having a contract job; and having a public sector job.

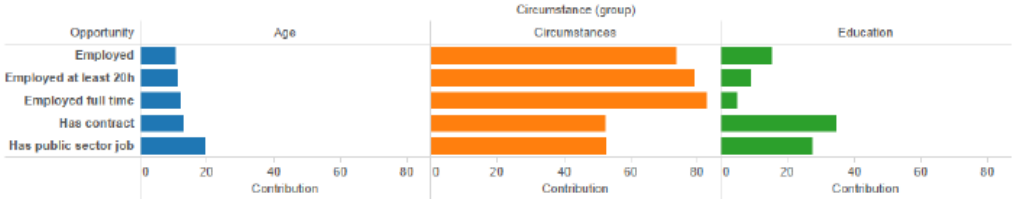
Results reported by the World Bank (2015f) show that none of these labor opportunities are equally distributed among population groups in Tunisia. As the opportunity refers to a more desirable job—full time, contract, public sector—its coverage expectedly decreases. Interestingly, the penalty, however, remains quite similar across opportunities in Tunisia (figure A) and does not seem to widen with quality of jobs. When accounting for the individual effects that circumstances and characteristics have on this estimated inequality to access labor opportunities, circumstances jointly explain the largest share (between 55 percent and 90 percent) of all access inequality, depending on the opportunity analyzed. But as jobs become more desirable, the role of education and age gain significance (figure B).

Figure A. Coverage and HOI for Labor Opportunities, 2012



Source: World Bank (2015f) using Youth Employment Survey 2012.

Figure B. Contributions to Inequality among Labor Opportunities, 2012



Source: World Bank (2015f), using 2012Youth Employment Survey.

III. POLICIES, POVERTY, AND DISTRIBUTION IN TUNISIA

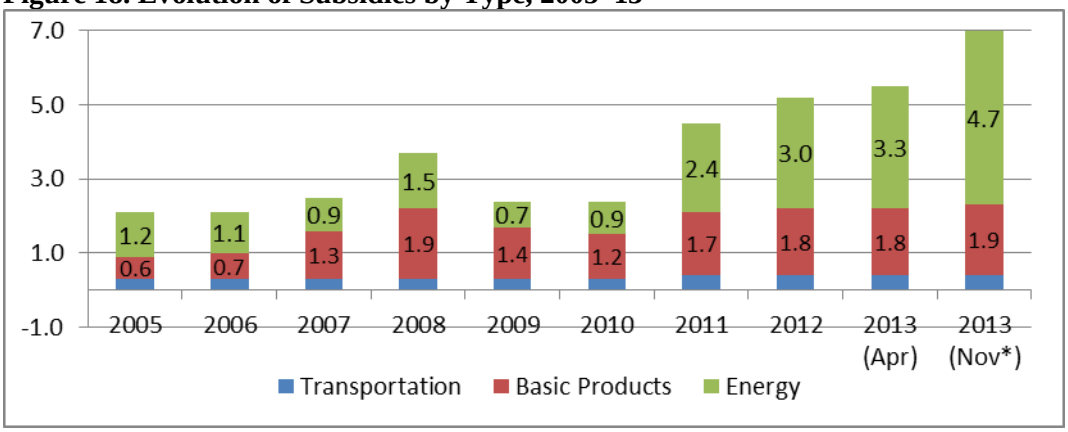
Chapter 6: Can Energy Subsidy Reform Improve Poverty and Inequality in Tunisia?

6.1 Energy Subsidies in Tunisia

6.1.1 Role of Energy Subsides in Development Strategy

Subsidies represented 7 percent of Tunisian GDP in 2013, the latest available estimate (figure 18). Public spending on subsidies exceeds that of social assistance, employment, health, education, and individual programs for youth, children, or women (World Bank 2013b). Total spending on subsidies increased during the revolution, and recently reached one-fifth of all public spending. In the case of energy subsidies, spending also substantially increased post-revolution, totaling two-thirds of all subsidies in 2013, up from one-third in 2010. This evidence confirms that generalized price subsidies constitute a deliberate cornerstone of social protection in Tunisia, a strategy initiated in the 1970s and that has remained in place (box 8). Advocates justify universal and general subsidies because of: the large size of the informal sector—whose competitiveness and survival is de facto protected by subsidies providing them with cheap energy sources; high levels of poverty in the past; and lack of information systems and registries to identify and target the poor. Furthermore, lack of political legitimacy of the previous authoritarian regime and the sensitive welfare implications of any subsidy reform—which inevitably generates winners and losers—have prevented for decades the decisive overhaul of subsidies in Tunisia.

Figure 18. Evolution of Subsidies by Type, 2005–13



Source: World Bank (2013b) using data from the Ministry of Finance.
Note: Basic products refer to food products such as cereals, bread, sugar, and vegetable oil; * = forecast.

It has been widely recognized—including by the transition government (Government of Tunisia 2014)—that current subsidies fail to protect the poor. It is estimated that the bottom 40 percent of the distribution captures only 29 percent and 34 percent of energy and food subsidies, respectively (World Bank 2014b). Past attempts to reform energy subsidies have also contributed to social tensions (box 8) and have generated concerns in terms of governance and transparency. For example, Tunisia lacks precise estimates of total subsidies for oil and natural gas generated by the national oil company selling imported crude oil and natural gas at a fraction of international prices to state-owned companies (IMF 2014a). Furthermore, subsidies typically introduce a whole series of economic distortions from relative price distortions; overconsumption and underinvestment in subsidized sectors; adverse effects on health and the environment; the crowding out of more productive investments; delays in economic diversification;

weaker current accounts; and increasing budget deficits (IMF 2014b; Cuesta et al. 2015). These fiscal, equity, social, and transparency concerns have prompted the government of Tunisia to consider changes in its subsidy policy, particularly for energy. Such a reform, however, constitutes a difficult balance between a decisive energy subsidy overhaul that reduces distortions and an intervention that does not increase inequality and social tensions.

Box 8. Evolution of Energy Subsidies in Tunisia

Tunisia has a long tradition of generous energy and food subsidies. Subsidies deliberately became the backbone of the new social protection strategies of the 1970s. In the early 1980s, however, Tunisia went through a painful experience reforming its food subsidies. In 1983, food subsidies reached 3 percent of GDP, but included significant leaks to the nonpoor. Overnight, the government announced the doubling of prices of cereals and their products, including bread, semolina, pasta, and couscous (IMF 2014b). The hasty decision took the public by surprise, and after a month of widespread protests, the reform was abandoned. Later, during the Ali regime, the government did not attempt any in-depth reform of the subsidy systems in place, managing instead to maintain the generous system throughout both difficult and prosperous times. During 1991–93, however, the government launched a gradual reform on food subsidies, favoring foods largely consumed by the poor—such as lower-quality bread—and phasing out subsidies on foods consumed by the rich. A well-timed awareness campaign coupled with increases in minimum wages and strengthening of other social protection programs helped simultaneously improve the targeting and fiscal burden of food subsidies. During the final years of the Ali regime and the recent post-revolution period, the spending and composition of Tunisia's subsidies have notably changed. During the last 10 years, the combined spending on energy, food, and transportation subsidies has more than tripled, rising from 2 percent of GDP in 2005 to 7 percent in 2013. Energy subsidies, in particular, increased fourfold during that period. Energy subsidies reached 4.7 percent of GDP in 2013, with sustained increases since 2010, reflecting the partial (rather than the full) pass-through of international oil prices to domestic prices sought by the government (ibid).

Post-revolution, the prices of gasoline, diesel, and electricity increased by 7 percent in September 2012, followed by similar increases in March 2013. Energy subsidies to cement companies were halved in January 2014 and fully removed in June 2014. Electricity tariffs on low- and medium-voltage consumers were increased in a two-step process, by 10 percent in January 2014 and another 10 percent in May 2014. The government introduced a lifeline electricity tariff for households consuming less than 50 kilowatt hours (kWh) per month in 2014. Also in January 2014, the government established a new automatic price formula for gasoline to align domestic price convergence to international prices over time, but without a smoothing mechanism or a clear calendar. In parallel, the government launched a new social housing program, increased income tax deductions for the poorest households, and committed to creating a unified registry of beneficiaries of social programs and improvement of social spending targeting (to be finished in 2015). In addition, plans are also in the works to expand the current cash transfer program (PNAFN) to 250,000 beneficiaries and to reduce its exclusion errors.

Source: IMF (2014b); Cuesta et al. (2015).

6.1.2 Residential Energy Consumption and Expenditures in Tunisia

This analysis focuses on residential energy subsidies; that is, subsidies on electricity, gasoline, liquefied petroleum gas (LPG), and diesel. They constitute the lion's share of the total consumer subsidies funded by government and about 45 percent of the total energy consumption among Tunisian households.[42] The current structure was introduced in May 2014 and continues to be in effect at the time of this writing. Reported estimates draw from the distribution of consumption and spending reported in the 2010 ENBCV, the most recent survey detailing households' expenditures. The 2010 structures of consumption and spending are then updated to May 2014 using growth rates, population growth, and official CPI rates.

[42] Specifically, solid biofuels constitute the main source of energy expenditure among households (42 percent), followed by LPG (18 percent), electricity (15 percent), and natural gas (10 percent). Diesels and gasoline are very low sources of energy expenditures, according to World Bank (2013b).

It is on those updated distributions that simulations of the impacts of a hypothetical reform in 2014 are conducted. Therefore, the analysis assumes that consumption patterns and their drivers, such as preferences, in 2010 are a good proxy for 2014 consumption patterns. Finally, poverty status is defined in this exercise around the official poverty lines established by INS, ADB, and World Bank (2012) as the monetized cost of a food basket that ensures minimum caloric needs, further adjusted by nonfood needs, and updated annually according to observed CPI trends. A simulation package, SUSBIM, developed by Araar and Verme (2012) produces all consumption and expenditure trends and analyzes alternative price scenarios.

The current price structure for residential electricity consumption is progressive, but hardly pro-poor. Tariffs follow a two-tier system (table 12)[43] that differentiates households consuming less than 200 kWh per month from those with higher volumes. For low-volume consumers, a volume-differentiated tariff is applied to three consumption blocks. In contrast, households consuming more than 200 kWh per month are subject to an increasing block tariff that includes multiple prices across different blocks of consumption (table 12). **This tariff structure is progressive** in that those consuming more pay higher marginal costs per kilowatt hour consumed. In effect, both low-volume and high-volume consumers face an increasing marginal cost from usage. In addition, high-volume consumers pay more than low-volume users for the first 200 kWh and face increasing fees as their consumption rises.[44] **However, the tariff system falls short of benefiting the poorer population.** The concentration of poor consumers on the lifeline block—low-volume consumers in 1–50 kWh tier—is only 48 percent (table 13), despite being deliberately aimed at the most disadvantaged consumers. Expectedly, households from the poorest quintile only represent a minimal proportion of consumers in the higher-volume tier (between 3 and 6 percent of tier 2 consumers).

The prices of energy sources other than electricity are not subject to differentiated price segments and they are neither progressive nor pro-poor. The prices of gasoline, LPG, and diesel do not vary across consumption levels. The market price of gasoline is TD 1.67 per liter; the price of 0.2 diesel (containing 0.2 percent of sulfur) is TD 1.25 per liter; and a 13 kilogram cylinder of LPG costs TD 7.4 (or TD 0.57 per kg). The price structure of these sources is not progressive because prices do not increase as consumption increases. Besides, in absolute terms, high-volume consumers benefit from a higher public subsidy, making those subsidies not pro-poor.

[43]Three prices apply for low-usage consumers: TD 0.075 per kWh, if consumption is 1–50 kWh; TD 0.108 per kWh (applied for all kWh consumed) if consumption is 51–100 kWh; and TD 0.140 per kWh if consumption is 101–200 kWh (also from the first kWh consumed). For high-volume consumers, TD 0.151 per kWh is charged for each of the initial 200 kWh consumed; TD 0.158 for each of the subsequent kWh in the 201 and 300 kWh block; TD 0.301 for the next 200 kWh block; and, finally, TD 0.501 per kWh for each of those in excess of 500 kWh per month. A different structure—of which analysis is beyond the scope of this chapter—is applied to nonresidential users (which also differentiates between low and high tension use).

[44] However, the pace at which marginal tariffs increase is not linear, which implies that the degree of progressivity declines as consumption increases among nonpoor households. When looking at the 50 kWh increments in consumption, moving from a consumption level of 50 kWh to 100 kWh, the price of the second 50 kWh is 44 percent higher than for the first tranche (from 75 to 108 millimes TD) among low-volume consumers. For those consumers moving toward the highest block of the second tier, that is, moving from 301–500 kWh to the 501 plus kWh block, the residential tariff increase is 25 percent or 70 millimes TD. In short, nonlinear features (in terms of marginal prices per additional consumption) are combined across different segments of the two-tier system, making the system far from progressive in its entirety.

Table 12. Electricity Tariff Structure for Low Tension Residential Consumers

Fee	Voltage (*millimes*/kVa/month)	Price of energy by monthly consumption bracket (millimes/kWh)					
		1–50	51–100	101–200	201–300	301–500	501+
Economic (1 and 2 kVa and consumption under 200 kWh)	500	75					
		108					
		140					
Economic (1 and 2 kVa and consumption over 200 kWh); normal (> 2 kVa)	500	151			184	280	350
						250	295

Source: Societé Tunisienne d'Eletricité et du Gaz (2014).
Note: Valid since May 1, 2014. Prices are in TD *millimes* and before taxes. kWh = kilowatt hour; kVa = kilo-volt-amperes or 1,000 volt amps.

Table 13. Distribution of Monthly Electricity Consumption Brackets by Quintile

Consumer <200 kWh per month	**Monthly consumption 1–50 kWh**					**Monthly consumption 51–100 kWh**					**Monthly consumption 101–200 kWh**				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Percent by quintile	48.1	19.2	12.9	11.6	8.2	32	25.5	20.1	13.7	8.7	15.9	20.5	23.2	22.6	17.9
Consumer >200 kWh per month	**Monthly consumption 1–300 kWh**					**Monthly consumption 301–500 kWh**					**Monthly consumption 501+ kWh**				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Percent by quintile	6.7	15.2	17.8	25.9	34.4	4.4	12.1	15.2	22.1	46.2	2.8	9.1	9.3	19.4	59.4

Source: World Bank staff calculations using SUBSIM (subsidy simulations).

The structure of prices and consumption patterns across socioeconomic groups reviewed above both lead to substantive inequalities in the per capita consumption and expenditures on energy among Tunisian households (see appendix 7). In effect, the average consumer in top consumption quintiles, that is, the richest quintiles, consume much more energy than the poorest quintiles. The largest consumption differences are observed for gasoline, followed by diesel (table 14, panel a). On average, an individual from quintile 5 consumes 200 times more gasoline than someone from the poorest quintile! That ratio is still a whopping 38 to 1 in the case of diesel. Much narrower differences are observed for electricity and LPG: a richer individual consumes 4.5 times more electricity and 1.4 times more LPG than an individual from the poorest household.

Large differences also become evident when spending is compared across quintiles of the consumption distribution. Households in the richest quintile spend more than six times the amount spent on energy on residential energy by the average household in the poorest quintile (in per capita terms, table 14, panel b). For gasoline and diesel, socioeconomic differences in terms of per capita spending are striking. For LPG and electricity, differences are less acute.

Table 14. Per Capita Consumption (quantity) and Expenditure (TD) of Subsidized Energy

a. Consumption per individual

Quintile	Gasoline (liter)	LPG (kg)	Diesel (liter)	Electricity (kWh)
1 (poorest)	0.46	36.50	0.45	37.41
2	2.30	45.35	1.95	49.59
3	8.45	49.08	3.70	61.23
4	25.02	55.99	5.58	86.58
5 (richest)	97.74	52.39	17.07	167.20
Total	26.79	47.86	5.75	80.40

Source: World Bank calculations using SUBSIM.

b. Expenditure per individual (TD)

Quintile	Gasoline	LPG	Diesel	Electricity	Total
1 (poorest)	0.77	20.81	0.56	36.70	58.83
2	3.83	25.85	2.44	56.36	88.48
3	14.11	27.98	4.62	67.63	114.33
4	41.78	31.91	6.97	88.35	169.01
5 (richest)	163.22	29.86	21.34	150.53	364.95
Total	44.73	27.28	7.19	79.91	159.11

Source: World Bank calculations using SUBSIM.

Appendix 7 reports that that the expenditure of energy represents between 5 and 6 percent of households' total spending, regardless of the socioeconomic status of the household. In other words, energy spending as share of household total spending is similar across socioeconomic groups, without marked differences across quintiles.

6.1.3 Quantifying Energy Subsidies in Tunisia

As indicated above, energy subsidies represent a substantive share of the national budget and the entire Tunisian economy.[45] However, official estimates on subsidies refer only to the actual budgetary costs publicly spent on energy subsidies; implicit sources of subsidies are not accounted for. This is the case, for example, of the generalized practice of the national oil company selling imported crude oil and natural gas at a fraction of international prices to state-owned companies. In the absence of official estimates, World Bank (2013a) suggests that these practices may have exceeded 2 percentage points of GDP in 2012. To account for both explicit and implicit subsidies, the current analysis recalculates energy subsides based on the observed final—market—prices, price structures, international prices (of imported sources), and local production costs. Box 9 summarizes the methodology used to recalculate subsidized price shares. Based on these estimates, it is possible to estimate the distribution of monetized benefits accruing from subsidies across quintiles of households (table 17).

[45] Most energy sources are publicly subsidized in Tunisia, but to different extents. Exemptions are other forms of energy commonly utilized by households, such as charcoal, natural gas or solid biofuels, which are not subsidized.

Box 9. Estimating Shares of Subsidized Prices

For energy products consumed by the household, namely electricity, LPG, gasoline and diesel, a subsidy level *S* for each product is estimated using the price gap approach. According to this approach, a first price is calculated by adding to the international reference price, *IP*, all local taxes and domestic distribution costs. The resulting price is assumed to reflect the cost of efficient market supply, given the conditions and regulations of a given country and international prices. This price is called the "nonsubsidized price" (*NP*). Subsidies (*S*) are calculated as the difference between the estimated *NP* and the observed domestic sale price, or market price (*DP*): $S_i = NP_i — DP_i$, where *i* refers to each energy source for residential consumption. The subsidy rate SR_i for source *i* is the ratio of S_i to NP_i. In the case of Tunisia, domestic prices used in this analysis are from the Ministry of Finance, and the *IPs* were obtained from the Ministry of Industries (Direction Générale de l'Énergie) for electricity, LPG, gasoline, and diesel.

Table A presents the rate of subsidized energy prices with respect to the observed market prices since May 2014. The rate of subsidized LPG prices is estimated at 68 percent of the nonsubsidized price. In other words, for every liter of LPG consumed at a final price of TD 0.570, some TD 1.220 have been subsidized from the estimated price of TD 1.790 (reflecting international reference prices). Likewise, a similar calculation shows shares of subsidized prices of 10 percent for gasoline and 21 percent for diesel. In the case of electricity, the subsidized rates for each block decrease with consumption. This is the case for the two-volume tiers. In fact, the two top consumption blocks of the high-volume tier—consumers of more than 300 kWh per month—receive negative subsidies. That is, they are net contributors to the subsidies of consumers of lower-volume consumption. Consumers from the two levels of highest consumption end up paying a higher price than the international reference price plus taxes and distribution costs.

Table A. Estimated Subsidy Rates for Energy Sources in Tunisia (valid May 2014)

Area	Nonsubsidized price (NP_i), TD	Subsidy (S_i), TD	Subsidy rate (SR_i=S_i/NP_i), percent	Market price, (DP_i=NP_i-S_i), TD
Gasoline	1.856	0.186	10	1.670
LPG	1.790	1.220	68	0.570
Diesel	1.584	0.334	21	1.250
Electricity: Households consuming less than 200 kWh per month				
Electricity 0–50	0.268	0.193	72	0.075
Electricity 0–100	0.268	0.160	60	0.108
Electricity 0–200	0.268	0.128	47	0.140
Electricity: Households consuming more than 200 kWh per month				
Electricity 0–200	0.268	0.117	43	0.151
Electricity 201–300	0.268	0.084	31	0.184
Electricity 301–500	0.268	-0.012	-4	0.280
Electricity > 500	0.268	-0.082	-31	0.350

Source: World Bank staff calculations.
Note: DP = market price; kWh = kilowatt hour; NP = nonsubsidized price; S = subsidy; SR = subsidy rate; TD = Tunisian dinar.

In fiscal terms, estimated LPG subsidies amounted to TD 749 million, 15 percent of all energy subsidies publicly transferred and 1 percent of GDP in 2013. Diesels have subsidies between 16 and 26 percent of final prices (depending on type of diesel), which represent 1.5 percent of GDP, 23 percent of energy subsidies, and TD 1,146 million in 2013. The energy source most highly subsidized in terms of public spending was electricity, with 3.4 percent of GDP, 51 percent of all energy subsidies, and more than TD 2.5 billion a year (in 2013). Its subsidized price share oscillated between 27 and 50 percent. The remaining 12 percent of energy subsidies were distributed among gasoline, kerosene, and heavy fuel.

Source: Cuesta et al. (2015); Araar and Verme (2012); World Bank (2013b).

Energy subsidies accruing to households are mainly for LPG and electricity. Together they account for more than 93 percent of all residential energy subsidies: 53.3 percent and 40.4 percent of total subsidies among *all* Tunisian households consist, respectively, of LPG and electricity subsidies. For the *poorest quintile* of households, these shares slightly increase to 54.5 percent and 42.2 percent, respectively (table 13, column a). For the rest of the quintiles, second to fifth, subsidies from LPG and electricity also capture the lion's share of total energy subsidy benefits across each quintile. When all energy subsidies are considered together, evidence suggests that they favor the rich to the detriment of the poorest quintiles. In fact, the poorest quintile captured the lowest share of all benefits associated with energy subsidies, 14.9 percent, and the richest quintile captured 25 percent (table 15, column b). **Energy subsidies are clearly not pro-poor in Tunisia**.

Table 15. Composition of Energy Subsidies Received by Residential Consumers

	a. Distribution across each quintile (percent)					b. Total distribution over all quintiles
Quintile	Gasoline	Diesel	LPG	Electricity	Total	(%)
1 (poorest)	0.1	0.2	54.5	42.2	100	14.9
2	0.4	0.7	56.6	42.3	100	17.9
3	1.4	1.1	55.1	42.4	100	19.9
4	3.8	1.5	55.7	39.0	100	22.4
5 (richest)	13.3	4.2	46.8	35.8	100	25.0
Total	4.5	1.8	53.3	40.4	100	100

Source: World Bank staff calculations using SUBSIM (subsidy simulations).
Note: TD = Tunisian dinar.

When benefits are analyzed in monetized terms, all energy subsidies are found to be regressive. The absolute amount of (per capita) subsidy benefits increases as individuals and households become richer (table 16). This regressivity is more marked for gasoline and diesel subsidies, where the average benefit of an individual in the richest quintile exceeds 202 and 38 times the monetized benefit of gasoline and diesel subsidies, respectively. LPG and electricity also exhibit regressive benefits from their subsidies, but not as significantly.

Inequalities in the distribution of subsidy benefits reflect inequalities in the consumption of energy sources across quintiles and do not seem to accrue from the universal versus targeted nature of subsidies. Even though gasoline, diesel, and LPG subsidies are all universal, their distributional patterns vary. In contrast, electricity subsidies, with their complex interplay of progressive and regressive features, do not perform differently from the universal LPG subsidy.

Table 16. Per Capita Energy Subsidy Benefits, in TD

Quintile	Gasoline	Diesel	LPG	Electricity	Total
1 (poorest)	0.09	0.15	44.53	36.99	81.76
2	0.43	0.65	55.33	41.42	97.82
3	1.57	1.24	59.88	46.06	108.74
4	4.65	1.86	68.30	47.85	122.67
5 (richest)	18.18	5.70	63.91	48.89	136.69
Total	4.98	1.92	58.39	44.24	109.53

Source: World Bank staff calculations using SUBSIM (subsidy simulations).
Note: TD = Tunisian dinar.

Benefits from energy subsidies represent a significant share of total household spending, ranging from 8.8 percent of total household expenditures for the poorest quintile to 2.4 percent for the richest quintile household expenditures (table 17). Consistent with previous results, LPG and electricity subsidies constitute the largest share of household expenditures, while gasoline and diesel do not represent any substantive share of total spending. For all households, these two sources of subsidies represent about 0.3 percent of total household spending, a small share of the 3.9 percent total household expenditures transferred from energy subsidies.

Table 17. Energy Subsidy Benefits as Percentage of Total Household Expenditure

Quintile	Gasoline	LPG	Diesel	Electricity	Total
1 (poorest)	0.0	4.8	0.0	4.0	8.8
2	0.0	3.4	0.0	2.6	6.0
3	0.1	2.7	0.1	2.1	5.0
4	0.1	2.2	0.1	1.5	3.9
5 (richest)	0.3	1.1	0.1	0.8	2.4
Total	0.2	2.1	0.1	1.6	3.9

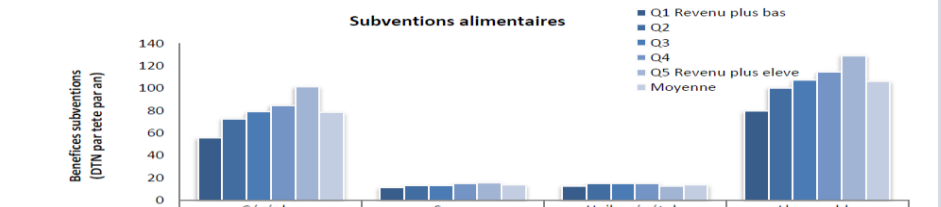
Source: World Bank staff calculations using SUBSIM (subsidy simulations).

All in all, the energy price structure results in a regressive and pro-rich transfer system that produces a huge fiscal bill. Distributive patterns across energy sources are heterogeneous, with LPG and electricity providing the largest share and amounts of subsidies among the poor (and among the nonpoor) consumers. This is not different from other subsidies in Tunisia (box 10) and has to do with the price and subsidy structure, on the one hand, and differences in the consumption patterns across socioeconomic groups, on the other. Whether the subsidy is universal or targeted does not make much of a distributional difference in the current Tunisian context.

Box 10. Are Other Public Benefits Pro-Rich and Regressive in Tunisia?

World Bank (2013a) details the average food subsidy benefits across socioeconomic groups in Tunisia. Figure A shows that those subsidies are regressive as the average subsidy increases across households with higher consumption levels. A foodstuff-specific analysis suggests that subsidies to cereals mostly determine the regressivity of aggregate food subsidies, because subsidies for sugar and vegetal oil follow a uniform pattern. Not shown here, but reported by World Bank (2013b, 12), food subsidies are not pro-poor either: the poorest consumption quintile benefits from 15 percent of total food subsidies, while 25 percent of such subsidy benefits accrue to the richest quintile.

Figure A. Benefits from Food Subsidies by Consumption Quintile, 2010



	Céréales	Sucre	Huile végétale	L'ensemble
Q1 Revenu plus bas	56	11	13	80
Q2	73	13	15	100
Q3	79	13	15	107
Q4	85	15	15	114
Q5 Revenu plus eleve	101	16	12	129
Moyenne	79	14	14	106

Source : Source : EBCM 2010, INS. Calculs du staff de la Banque Mondiale. Les valeurs ont été ajustées sur la base des prix des carburants à partir d'avril 2013. « Q » signifie quintile.

Conclusions change when the distribution of implict benefits to households with children attending public education is added to the analysis. The implicit benefit is that obtained by any child attending primary school for a service that receives mainly for free. This benefit is then netted out from the costs incurred by the household to send the child to school (fees, transportation, materials, uniforms). Substracting the costs reported directly by households on education to the estimated average cost of provision to the state to provide preschool, primary, and secondary education per governorate, figures B and C show that these implicit benefits are progressive. In effect, the average benefit provided by the state decreases along with the socioeconomic level of the household to which the child belong (gross benefit in figures B and C). Also, the average cost of each family to send their children to school increases along with the socioeconomic level of the household (household expenditure in figures B and C). As a result, the net benefit also decreases alongside socioeconomic levels, making public spending on education progressive.

Figure B. Annual Unitary Benefits per Student in Preschool/Primary School by Quintile of Consumption

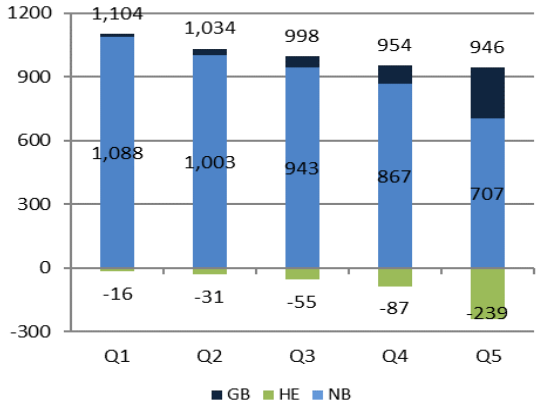
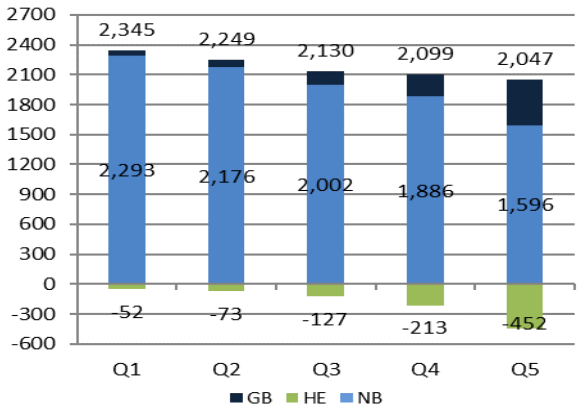


Figure C. Annual Unitary Benefits per Student in Secondary School by Quintile of Consumption



Source: Authors' calculations using ENBCV 2010 and data from Ministry of Education.
Notes: GB = gross unitary benefit; HE = households per student expenditure; and NB = net unitary benefit. All numbers in 2010 TD.

6.2 Simulating the Distributional Impacts of a Subsidy-Reducing Reform

6.2.1 Simulation Methodology

Although the Tunisian authorities have recently announced their intention to reform energy subsidies, policy is still in the planning stages and final details remained unknown at the time of this writing. The limited existing information, however, points to a complete elimination of LPG, diesel, and gasoline subsidies; a uniform 10 percent increase in the price of electricity; and the introduction of compensation mechanisms to residential consumers (Jomaa 2014). The present analysis first simulates the impact of the increase in energy prices that would follow a reform of energy subsidies along the general lines just described (box 11 details the methodology used for that simulation). In a second stage, the analysis constructs several scenarios that simulate the additional poverty and inequality impacts of increasingly effective targeting mechanisms accompanying the subsidy reform. Those targeting mechanisms make use of the total fiscal savings freed from the reform in energy subsidies to compensate consumers. In other words, the analyzed simulations of compensatory initiatives postreform are all fiscally neutral. They are bold and ambitious in that they assume that *all* fiscal savings from the energy reform would be fully destined to poverty reduction. The scenarios are also ideal in that they assume no additional administrative costs. Still, they are useful to assess the distributive limits that compensation measures will have after energy subsidies are reformed.

6.2.2 Consumption, Expenditure, and Poverty Impacts of Uncompensated Energy Subsidy Reforms

Table 18 presents the monetary impact of price increases resulting from the removal of subsidies for gasoline, LPG and diesel, and the partial reduction in electricity subsidies. Final results from this simulation are disaggregated between direct and indirect effects in appendix 8. The average *total* impact of this set of interventions is a reduction in the transferred benefit from subsides equivalent to TD 109 per capita per year. The largest effect on consumption comes from the removal of LPG subsidies, followed by diesel, electricity, and gasoline. In effect, about 62 percent of all the reduction in consumption comes from the elimination of LPG subsidies. By type of effects, direct effects represent two-thirds of the total aggregated effect, and indirect effects the remaining one-third. However, the relative weight of direct and indirect effects are not uniform across energy sources.[46]

Box 11. Distributive Simulations of Energy Subsidy Reforms

Given the preliminary stage of the policy discussion, simulations consider two broad effects. One is the direct effect of price increases following the partial or full removal of subsidies. Direct effects have unequivocal impacts on individual and household budgets proportional to the increase in prices of energy sources. No immediate changes in consumption are assumed, which is consistent with limited substitutability among energy sources in the short run (due to both technical and financial reasons and, presumably, individual preferences). So, immediately after the reform is introduced, everyone consumes the same, but at higher prices. This result implies that individuals and households have fewer resources to purchase other goods and services. Changes in prices are equivalent to a proportional increase in the

[46] Among direct effects (appendix 6, panel b), it is the effect of LPG that once again has the largest impact on household consumption (four-fifths of all direct effects), followed by electricity, gasoline, and diesel. In contrast, it is the removal of diesel subsidies that has the largest indirect effect on consumption (43 percent of total indirect effects), followed by LPG, electricity, and gasoline (appendix 8, panel c).

poverty line faced by the household (weighted by its relative composition in the basic consumption basket). The second effect considered is the indirect impact, and it relates to changes on prices of goods and services that result from energy price changes. The indirect effect captures the change in relative prices for the rest of the economy and, consequently, on the prices of the other components of the consumption basket. Price changes across sectors are estimated by applying the price changes of energy to final products that use energy as an intermediary input. Using the 2010 input/output (I/O) table for Tunisia, constructed by the INS, a simple approximation of such economywide changes following energy price subsidies can be calculated.

The analysis draws from the distribution of consumption and spending reported in the 2010 ENBCV—the most recent survey. The 2010 structures of consumption and spending are then updated to January 2014 using growth rates, population growth, and official CPI rates. Poverty status is defined in this exercise around the official poverty lines established by INS, ADB, and World Bank (2012) as the monetized cost of a food basket that ensures minimum caloric needs, further adjusted by nonfood needs.

Source: Cuesta et al. (2015); Araar and Verme (2012).

Among quintiles, the total impact of the reform increases among richer households. Thus richer households would stop receiving larger energy subsidy benefits following their reform. **Thus, in absolute terms, the reform is progressive**. The largest differences of foregone benefits across quintiles are observed for gasoline. The differences are less marked for diesel and electricity and relatively close for LPG. The increasing impact on consumption among richer quintiles is also observed for both direct and indirect effects.

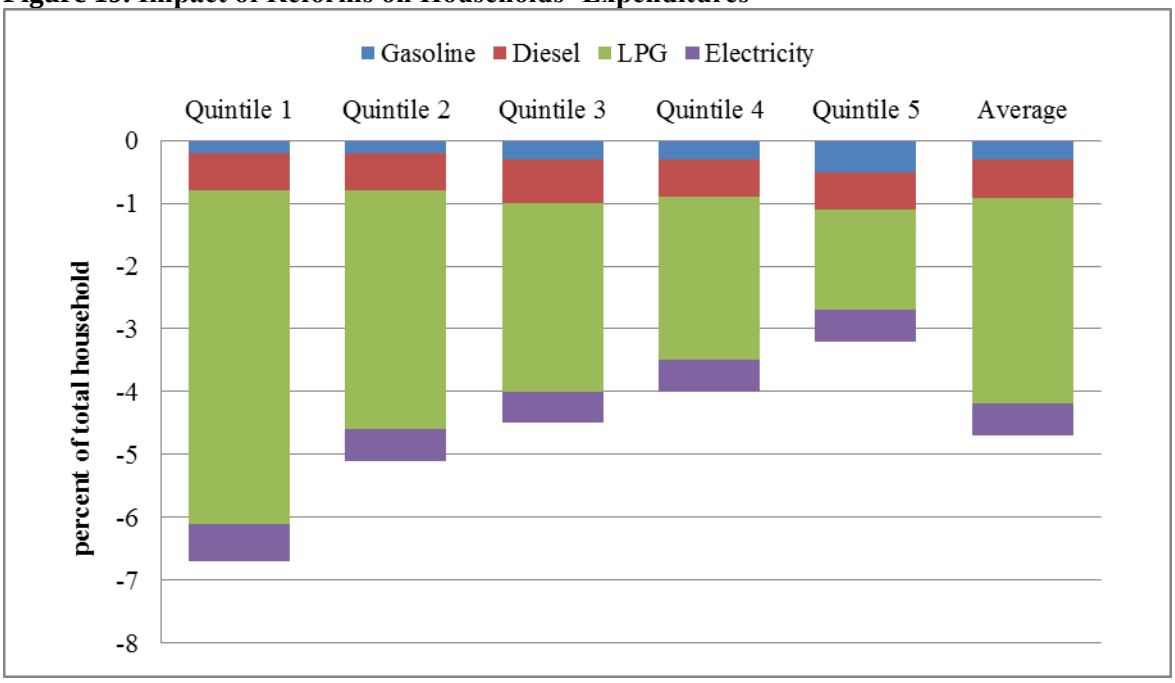
Table 18. Impact of the Reform on Total Per Capita Expenditures (by energy source and quintile of consumption, in TD), Total Effects

Quintile	Gasoline	LPG	Diesel	Electricity	All
Quintile 1	-1.9	-47.3	-5.9	-5.5	-60.5
Quintile 2	-3.7	-60.7	-10.3	-8.7	-83.5
Quintile 3	-6.3	-67.7	-14.7	-11.1	-99.7
Quintile 4	-11.1	-79.6	-19.8	-15.0	-125.5
Quintile 5	-28.1	-85.8	-36.2	-27.0	-177.1
Total	-10.2	-68.2	-17.4	-13.5	-109.3

Source: World Bank staff calculations using SUBSIM (subsidy simulations).

In relative terms, the impact of the reforms averages 4.7 percent of households' expenditures (figure 19). **The magnitude of the impact decreases with household expenditure levels, so in relative terms the reform is regressive.** It regressively declines from 6.7 percent of the poorest households' expenditures to 3.1 percent of the richest households' expenditures. Similar to the case in absolute terms (that is, in TD terms), it is the LPG subsidy reform that brings the largest relative impact on households' expenditures: some 3.2 percent of all households' expenditures (and more than 5 percent of the poorest quintile households' expenditures).

Figure 19. Impact of Reforms on Households' Expenditures



Source: World Bank staff calculations using SUBSIM (subsidy simulations).

The reduction in benefits that households receive after the reform would lead to a 2.69 percentage point increase in the incidence of poverty in Tunisia, which represents an increase of 17 percent with respect to the prereform baseline poverty incidence (table 19). Table 19 also shows a Gini coefficient increase of 0.61 percentage points, or a 1.7 percent increase in the prereform levels of inequality. A large portion of those changes in poverty result from direct effects, both in poverty and in inequality, and LPG is the largest contributor to poverty and inequality deterioration.

Table 19. Poverty and Inequality Impacts of Energy Reform

	Percentage points	Change in pp w/prereform		Percentage points	Change in pp w/prereform
Poverty prereform	**14.93**	**---**	**Gini prereform**	**35.81**	**---**
Gasoline	15.02	0.09	Gasoline	35.75	-0.06
LPG	16.84	1.91	LPG	36.43	0.62
Diesel	15.12	0.19	Diesel	35.82	0.01
Electricity	15.13	0.2	Electricity	35.83	0.02
Poverty postreform	**17.61**	**2.68**	**Gini postreform**	**36.42**	**0.61**
Misc. direct effect		*1.95*	*Misc. direct effect*		*0.58*

Source: World Bank staff calculations using SUBSIM (subsidy simulations).
Note: The reason the prereform poverty and inequality rates are not the official rates for 2010 is that prices have all been updated for this specific exercise to 2013 prices using growth rates and population growth rates. The poverty line has also been updated using CPI trends. Therefore, the starting point of this exercise is a poverty rate of 14.9 in 2013 rather than the 15.4 percent official estimate obtained in the 2010 original household budgetary survey. This adjustment enables comparisons across other countries. However, the rest of the simulation exercise will be conducted using the 2010 household budgetary survey. A subsample of the 2010 survey is used, and not the full sample of the original survey. In effect, it is a subsample of the original sample that is used to capture beneficiaries of the subsidized universal health care card. Even after reweighting the subsample, the exact official poverty number of 15.4 percent could not be fully replicated, only a slim margin (15.3 percent). Similarly, the estimated prereform Gini of 36.5 percent differs slightly from the official 35.8 percent from the full sample.

6.2.3 Subsidy Reforms with Compensating Transfers

The reduction of energy subsidies are estimated to generate some TD 817.5 million in fiscal savings (table 20). Fiscal savings accrue disproportionally from the removal of subsidies in LPG (77 percent of all fiscal savings) and electricity (13 percent). Furthermore, savings accruing from the removal of subsidies affecting the poorest quintile represent some 13 percent of all fiscal savings, a share that increases across quintiles. Thus, savings accruing from benefits removed from the richest group represent 28 percent of the total savings. These shares are very similar to the proportions of benefits from subsidies that each socioeconomic group captured prior to the reform (table 15). This is unsurprising since these simulations do not introduce behavioral effects (only direct and indirect effects are allowed). Consequently, fiscal savings from the elimination of subsidies for the most part reflect the initial socioeconomic distribution of subsidies.

Table 20. Energy Subsidy Savings from the Reform (by source and quintile of consumption, in TD)

Quintile	Gasoline	LPG	Diesel	Electricity	Total
1 (poorest)	-186,020	-97,003,152	-325,901	-11,624,507	-109,139,584
2	-929,258	-120,432,824	-1,418,063	-16,163,867	-138,944,016
3	-3,420,753	-130,381,216	-2,689,996	-19,003,020	-155,494,992
4	-10,129,942	-148,695,856	-4,054,068	-23,481,422	-186,361,280
5 (richest)	-39,575,064	-139,133,344	-12,414,583	-36,451,727	-227,574,720
Total	-54,241,036	-635,646,400	-20,902,610	-106,724,543	-817,514,560

Source: World Bank staff calculations using SUBSIM (subsidy simulations).

A final step in the simulation exercise includes assessing the poverty and distributional effects of disbursing the total savings from the energy subsidy reform for poverty-reducing purposes. Once again, there is no clear guidance from the government of Tunisia on how these compensation programs will be implemented. For that reason, this analysis considers three hypothetical scenarios. **Simulation 1** uses total savings to provide a universal transfer to each Tunisian. This scenario is called "universal transfer" because it includes a transfer to every Tunisian without discrimination. **Simulation 2**, or "current targeting," uses the current social assistance program, the subsidized health cards, as the targeting mechanism. This label does not intend to judge the current capacity of subsidized cards to reach the poorest. Instead, it simply indicates that no additional targeting efforts take place and authorities use existing structures to channel all the savings accruing from energy subsidy reforms. Finally, in **simulation 3**, "perfect targeting," all the savings are distributed exactly to those who are poor after the reform. This is an idealistic scenario that describes a situation in which all the poor after the reform are perfectly identified and compensated on a per capita basis. It also assumes perfect and costless targeting; in other words, no additional resources are needed to identify the poor and distribute cash benefits to them. Although these three scenarios vary in terms of implementation feasibility, they are still useful in a context where no detailed plans are known. In effect, these results provide information on the boundaries of the distributional effects of the reform, from no compensation following the reform to the complete use of fiscal savings from the energy subsidy reform to reduce poverty under perfect targeting. The true impact of the reform and of feasible compensation policies will lie somewhere in between. Table 23 summarizes the simulations' results.

Table 21. Simulated Poverty and Inequality Impacts of Compensatory Mechanisms after Energy Subsidy Reform

	Fiscal cost of compensation	Average benefit transferred (rounded up)	Number of beneficiaries	Poverty (%)	Inequality (Gini 0–100 index)
Prereform	0	0	0	15.27	36.57
Baseline: Subsidy reform with no compensation	0	0	0	17.84	37.18
Simulation 1: Universal transfer after subsidy reform	TD 817.51 million	TD 75	10.9 million	14.87	36.29
Simulation 2: Current targeting	TD 817.51 million	TD 264	3.1 million	13.83	35.46
Simulation 3: Perfect targeting	TD 817.51 million	TD 420	1.9 million	5.25	34.22

Source: World Bank staff calculations using SUBSIM (subsidy simulations).

These simulations suggest that the complete use of fiscal savings from the energy reform would not reduce post reform poverty levels by any significant amount with the current targeting mechanism or via an universal transfer to the entire population (simulations 2 and 1 in table 21, respectively).The fiscal savings accruing from a universal transfer reform (simulation 2) would bring down postreform poverty levels by 2.5 percentage points—or some 272,000 persons. Using the current health card targeting mechanism (simulation 1) would reduce postreform poverty by an additional percentage point, to 13.83 percent of the population. A perfect and costless targeting of fiscal savings (simulation 3) would lead to a postreform poverty incidence reduction of 12.5 percentage points, up to 5.25 percent of the population. Despite the slash in poverty incidence, the fiscal resources freed from the current level of energy subsidies would not be sufficient to completely eradicate poverty in Tunisia. Neither would it be sufficient to make a notable dent on consumption inequality as measured by the Gini coefficient. The three compensation initiatives would fully reverse the initial increase in inequality following the subsidy reforms, but the reduction in inequality would by no means be large. The best results, accruing from the perfect targeting scenario, indicate gains of 3 percentage points in the Gini coefficient, with respect to the postreform Gini. In relative terms, the compensation mechanisms simulated after the reform would improve inequality by less than 10 percent.

In conclusion, results from simulations underscore two critical results. First, raising electricity prices to consumers and removing subsidies for other energy sources would immediately—that is, without behavioral responses from users—increase poverty by 2.5 percentage points. Second, "easy" compensation mechanisms— that is, either universal or using current structures—will not bring substantial poverty reductions, even if the government channels the entire TD 817.5 million estimated to be saved from the subsidy reform toward poverty reduction. Perfect and costless targeting would slash poverty incidence down to 5 percentage points; yet while this ideal scenario would imply a substantial reduction in poverty, it would still fall short of eradicating poverty, and inequalities would be reduced in even more modest terms. Tunisia is still far from having such an ideal targeting system with comprehensive and updated lists of beneficiaries and minimal transaction costs. In addition, it should not be expected that all fiscal savings from the energy subsidy be invested back into poverty reduction. What becomes clear from these proposed simulations is that bold reforms of energy subsidies need to be accompanied by equally bold improvements to the targeting schemes of public spending if both poverty and disparities are to be substantively reduced.

Chapter 7: How Can Multidimensional Poverty Be Improved: The case of Child Malnutrition?

7.1 Linking Multiple Public Interventions to Nonmonetary Welfare in Tunisia

The analysis of energy subsidy reform in the previous chapter suggests that Tunisia still has ample room for better integrating its public policies aimed at reducing poverty, disparities, and vulnerabilities. An overhaul of the energy subsidies in Tunisia will have significant poverty and distributional effects unless substantial improvements in social protection are synchronized to the subsidy reform. But this analysis on energy subsidies focuses on the role of public policy interventions on *monetary* poverty and disparities and does not connect policy making with *nonmonetary* dimensions of welfare. To fill that gap, this section explicitly analyzes public interventions from a nonmonetary welfare perspective while also underscoring the need for further integration among multisectoral interventions. Ultimately, this analysis addresses the fundamental question of how can public interventions be better integrated to reduce poverty and vulnerability in Tunisia.

For this analysis, child malnutrition was selected as the nonmonetary dimension of welfare (box 12). This is an interesting dimension to analyze for several reasons. Tunisia has already achieved its hunger-related MDG and it is a good performer in terms of child nutrition among its regional neighbors. Yet, progress has not been steady over time, and socioeconomic differentials still persist within the country (box 12). More generally—that is, not specific to Tunisia—child malnutrition has long-term welfare consequences in terms of impaired cognitive ability and reduced school and work performance (Haas et al. 1996; Glewwe, Jacoby, and King 2001; Hoddinot and Kinsey 2001; Maccini and Yang 2009). It has been long known that the determinants of nutrition are multisectoral and therefore the solution to malnutrition requires multisectoral approaches (UNICEF 1990). Strong synergies among multiple determinants need to happen before real progress in nutritional status takes place, especially for those first, critical 1,000 days in the life of a child. In other words, concrete improvements in malnutrition are typically the result of integrated policies that include nutrition interventions—such as fortification of foods, promoting breastfeeding, treating malnourished children with therapeutic foods—as well as interventions from other sectors, such as childcare programs for working mothers, improvements in agriculture productivity; and the strengthening of safety nets and more (SUN 2012).

Box 12. Child Nutrition in Tunisia

With prevalence levels around 1 percent, Tunisia has long achieved MDG Target 1C to halve, between 1990–92 and 2015, the proportion of people suffering from undernourishment—that is, inability to meet a minimum level of dietary energy consumption—or reduce this proportion below 5 percent (FAO 2015).

Most recent statistics specific to children nutritional status report a 7 percent incidence of low birth weight; 2 percent of moderate and severe underweight; 10 percent moderate and severe stunting; and 3 percent moderate and severe wasting for 2008–12 (UNICEF 2014).[a] These numbers suggest that Tunisian children's nutritional status is better than the average for the Middle East and North Africa (MENA) region, which averages 7 percent, 18 percent and 8 percent, respectively, for moderate and severe underweight, stunting, and wasting. Tunisia's record for these three indicators is comparable with Morocco, Jordan, Algeria, and Palestine's records for 2008–12, and markedly more favorable than the region's worst performers, Djibouti and the Republic of Yemen.

Practices including introduction of breastfeeding and semisolid and soft foods as well as consumption of iodized salt all place Tunisia among the best performers in the MENA region—for countries for which information is available. Other nutritional indicators, however, such as moderate and severe overweight or prevalence of anemia among women at reproductive age are not so favorable and remain short of international targets (the Global World Health Assembly targets, as reported in IFPRI 2014). Also, important determinants of child nutrition such as water and

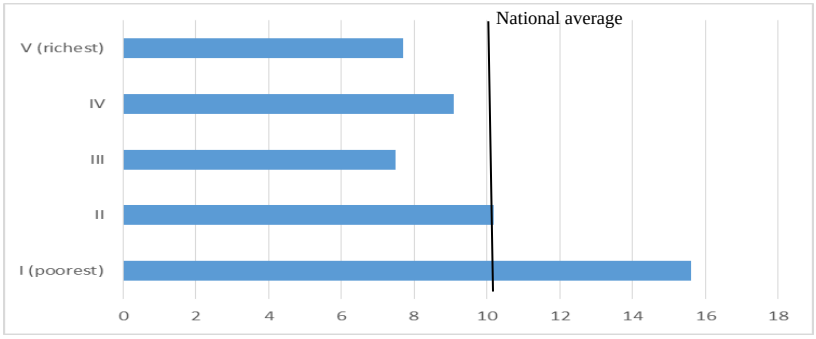
sanitation suggest high levels of access. However, when quality aspects are taken into consideration, such as non-shared toilets and safe disposal of child feces, very few Tunisian households have adequate access to water and sanitation (less than 2 percent, see appendix 9). This lack of adequate access should be expected to affect the nutritional status of Tunisians in some or another way.

Importantly, improvements in stunting among Tunisian children have proven not to be steady and sustained over time, as indicated in figure A. In addition, socioeconomic differences among children prevail in terms of their nutritional status, as clearly suggested by height-for-age outcomes by socioeconomic status (table A). Consequently, notwithstanding its achievements, Tunisia still has work ahead to eradicate child malnutrition.

Figure A. Prevalence of Under-5 Stunting in Tunisia (percent)

Source: UNICEF/WHO/WB 2014.

Table A. Socioeconomic Differences in Stunting among Tunisian Children



Source: UNICEF/WHO/WB 2014.

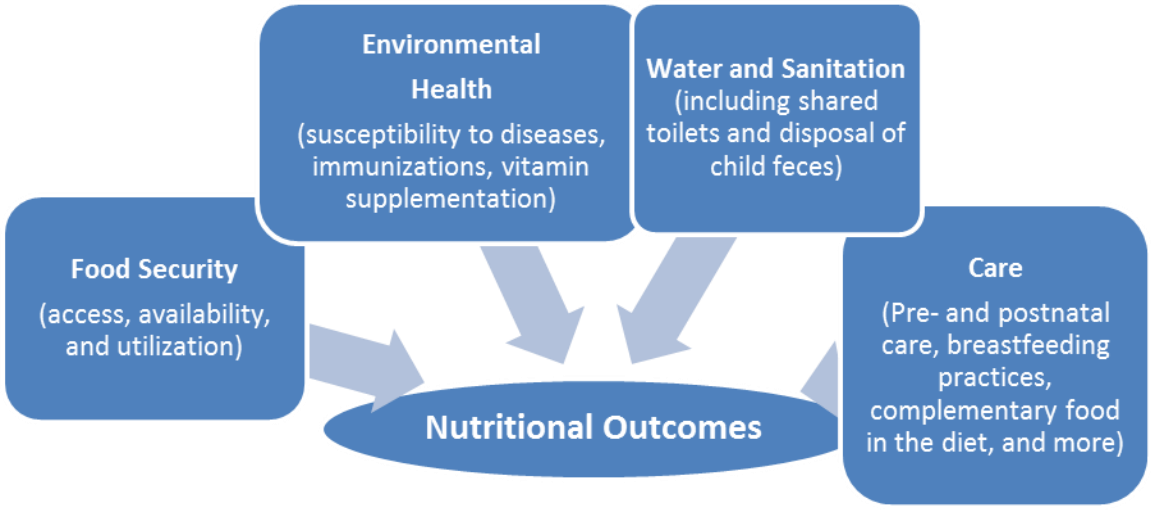
Source: FAO (2015), UNICEF, WHO and World Bank (2014)
a. Low birth weight is defined as the percentage of infants weighing less than 2,500 grams at birth. Moderate and severe underweight is the percentage of children aged 0–59 months who are below -2 standard deviations (SD) and below -3 SD from median weight for age of the World Health Organization's (WHO) Child Growth Standards. Moderate and severe stunting captures the percentage of children aged 0–59 months who are below -2 SD from median height for age of the WHO Child Growth Standards. Moderate and severe wasting is the percentage of children aged 0–59 months who are below -2 SD from median weight-for-height of the WHO Child Growth Standards.

Conceptually, the analytical framework in this section follows UNICEF's integrated approach to food security and nutrition. UNICEF's framework—and a recent extension by Skoufias et al. (forthcoming)—emphasizes the role that food security, environmental health, water and sanitation, and child care practices play in food insecurity—approximated in this study by stunting rates among children in developing countries (figure 20).[47] This framework suggests that increases in access to only one of these

[47] Food security measures the availability and consumption of various food. Environmental health measures the child's susceptibility to diseases due to lack of improved infrastructure (such as sanitation and drinking water) or lack of preventive health measures taken. Care measures the quality of care provided by the caretaker based on feeding and hygiene practices adopted and by the availability of the caretaker. Furthermore, this measure includes how well caretakers are supported in their child-rearing endeavors.

factors cannot substitute for inadequate levels of other factors. Thus, for example, policies than improve food security alone cannot resolve the issue of malnutrition if the community does not have appropriate levels of safe water and sanitation or prenatal health services.

Figure 20. Integrated Multisectoral Interventions for Proper Nutrition in Children



Source: Adapted from Skoufias et al. (forthcoming) and UNICEF (1990).

Another important contribution of the UNICEF framework is the notion of *adequate* access to basic services that introduces a quality dimension that goes beyond merely access to a service. For example, food adequacy implies more than access to sufficient food to cover minimum caloric requirements, but also requires access to a balanced, diverse, and affordable diet. Similarly, adequate water access goes beyond accessing a source of safe water—it implies a continuous, predictable, and affordable supply of water. In practice, however, there is a gap between *ideal* or desired definitions of adequacy and practical definitions of adequacy *feasible* from available data. Table 22 compares ideal definitions of adequacy for all of the dimensions considered in UNICEF's framework with information available in the Tunisian 2011–12 MICS.

Table 22. Defining WASH and Other Adequacies of Child Nutrition Status

Ideal adequate care	Available in MICS 2011–12?
Maternal education, knowledge, and beliefs	Available, but no international consensus on appropriate thresholds
Workload and availability of caregiver	X
Social support for caregiver	X
Psychosocial care	√
Caring behaviors: Breastfeeding	√ MICS details whether breastfeeding was exclusive during first six months; within one hour of birth; continued breastfeeding
Caring behaviors: Health seeking	X Available, but no international consensus on appropriate

	thresholds
Caring behaviors: Complementary feeding	√
Caring behaviors: Hygiene	X Soap has been reported as available for hand washing, but very few observations
Caring behaviors: Child feeding index	X
Ideal adequate food (food security dimension)	
Household dietary diversity score	X
Children's dietary diversity score (CDDS)	√ With sufficient differentiation of food groups and meal frequency to calculate CDDS
Women's dietary diversity score	X
Minimum acceptable diet (for children aged 6–24 months)	√ A combination of breastfeeding, intake of diverse food, and meal frequency
Food Insecurity Experience Scale	X
Household Hunger Scale	X
Coping Strategy Index	X
Percentage of households that cannot afford a balanced diet	X
Relative prices of different food groups	X
Percentage of calories from starches	X
Percentage of people lacking access to calories	X
Ideal adequate water and sanitation	
Access to safe water	√
Access to improved sanitation	√
Community-level sanitation	√
No shared toilets	√
Safe disposal of child feces	√
Hand-washing hygiene	X Limited number of observations
Ideal adequate environmental health	
Use of prenatal services	√
Age appropriate immunization status	√ (ages 18–29 months only)
Vitamin A supplementation status	X
Oral rehydration solutions use for treatment of diarrhea	X
Antibiotic treatment for pneumonia	X

Source: World Bank staff.

This comparison highlights serious data limitations preventing a comprehensive definition of adequacy across food security dimensions in Tunisia. Yet, it is still possible to capture adequacy with available

information to some or other extent. In fact, the extent to which the definition of adequacy captures all the ideal aspects of each policy dimension differs by dimension. Thus, a relatively restrictive definition of adequate access for care and environmental health contrasts with more inclusive definitions for food, water and sanitation. For example, in the case of sanitation, the definition of adequacy can be adjusted to account for several criteria, following the WHO/UNICEF Joint Monitoring Programme recommendation to include improved sources of water and sanitation, non-shared toilet facilities, and safe disposal of child feces. Another variable of interest, hygienic hand-washing practices, is captured in the MICS, but its incidence is very low (less than 70 observations). This discourages its use in the empirical analysis.

7.2 Estimating the Impact of Interventions on Nutrition in Tunisia

Various international organizations, such as the Food and Agriculture Organization (FAO), the United States Agency for International Development (USAID) and the World Food Programme (WFP), have adopted the UNICEF framework as a common conceptual background to analyze nutrition. Recently, the World Bank extended the conceptual approach to provide evidence-based empirical insights on the nutritional returns of policy interventions when limited financial resources or capacity on the ground do not permit simultaneous improvements on all fronts. In concrete, **Skoufias et al. (forthcoming) estimate both the individual effects of several adequacies (that is, adequate access rates of basic services) and the effects of their combined interactions on the nutritional status of children** captured by height-for-age z-scores (HAZ scores) for children aged 0–2 years and 0–5 years. They estimate an econometric specification correlating HAZ scores with the four adequacy measures and their interactions (box 13) and assess which of those interactions are significant in reducing stunting among children in several developing countries. These interactions are interpreted as additional gains or losses to child nutritional status derived from the simultaneous adequate access to basic services.

Box 13. Econometric Application of the UNICEF Framework

Skoufias et al. (forthcoming) estimate a single equation that links adequacies to basic services (As) with the nutritional status of children, or stunting, captured by the HAZ score. Specifically, the equation is:

$$HAZ = \alpha + \sum_{i=1}^{4}(\beta * A)_i + \sum_{i,j=1}^{4}\gamma_{ij}(A_i * A_j) + \sum_{i,j,k=1}^{4}\gamma_{ijk}(A_i * A_j * A_k) + \gamma_{1234}(A_1 * A_2 * A_3 * A_4) \quad (1)$$

where HAZ_i is the HAZ score for child i, and where $i, j, k = 1\ldots4$ denotes each of the four dimensions considered, that is, food, water and sanitation, environmental health, and care. Thus, A_i denotes access to each of the four adequacies for each child i. Namely, A_1 is 1 when the household has adequate food (F) and is 0 otherwise; A_2 is 1 when the household is adequate in environmental health (H) and is 0 otherwise; A_3 is 1 when the household has adequate in water and sanitation (W); and A_4 is 1 for households with adequate care (0 otherwise). These measures are independent of whether the child has access to each of other three adequacies considered.

In this specification, the constant term α provides an estimate of the mean value of HAZ scores for children without access to adequate food security ($A_1 = 0$), environmental health ($A_2 = 0$), water and sanitation (A_3), and care ($A_4 = 0$). That is, the constant term capture E (HAZ | $X = x$) or the expected (or mean) value of height for age, conditional on a control variable X when none of the adequacies are met (and assuming also that E (ε_i | A_1, A_2, A_3, A_4)=0):

$$E(HAZ_i \mid A_1=0, A_2=0, A_3=0, A_4=0) = \alpha \quad (2)$$

The coefficient β_1 in (1) yields an estimate of the increase in the mean HAZ score for children that have access to adequate food security only ($A_1 = 1$), but do not have access to adequate environmental health ($A_2 = 0$), adequate water and sanitation ($A_3=0$), and no access to adequate care ($A_4 = 0$). The reference group is the group of children

satisfying no adequacies, that is, the mean HAZ score for the reference group summarized by the constant term. The coefficients β_2, β_3, and β_4 have analogous interpretations for environmental health, water and sanitation, and care, respectively. The coefficients' γs yield estimates of synergies or complementarities from having access to more than one determinant of nutrition. Specifically, the mean HAZ score for children with access to adequate food security ($A_1 = 1$) *and* adequate environmental health ($A_2 = 1$) is summarized by the expression:

$$E(HAZ_i \mid A_1=1, A_2=1, A_3=0, A_4=0) = \alpha + \beta_1 + \beta_2 + \gamma_{12} \qquad (3)$$

Thus, the mean value of HAZ scores for children in households with access to adequate food security *and* adequate environmental health can be considered as consisting of the sum of three components: the first component is the increase in HAZ scores associated with children in households with adequate food security only (that is, β_1); the second component (that is, β_2) is the increase in HAZ scores associated with children in households with adequate environmental health only; and the third component (that is, γ_{12}) is the increase in HAZ scores associated with children in households that have access to both adequate food security and adequate environmental health. Thus, the coefficient γ_{12} yields information on whether there are additional (extra) gains (or losses) in HAZ scores derived from joint access to adequate food and health compared to exclusive access to adequate food and exclusive access to adequate health. A significant and positive value of the coefficient γ_{12} implies synergies from the simultaneous access to adequate food security and adequate environmental health in the production of child nutrition.

In the case of Tunisia, equation (1) is estimated using data on children age 0 to 24 months from the 11–12 MICS. Results are presented for the entire country as well as disaggregated for the poor and nonpoor samples, and for urban and rural households. A final sample combines rural and the poorest quartile of the distribution of households (based on their assets) in an attempt to capture particularly disadvantaged groups. This allows for a better understanding of differences that policies may have across differentiated sets of households.

Source: Skoufias et al. (forthcoming).

Unfortunately, the model does not allow for *causal* inference on the effects of the various adequacy components on nutrition. Instead, this specification allows for the exploration of the correlation between the various adequacy measures and nutritional outcomes as measured by HAZ scores. A second caveat is that the estimation of the model is affected by the few observations of some of the synergies considered. Likewise, to the extent that adequacies are more strictly defined (table 24), the observations satisfying each adequacy may be very few, thus compromising the quality and precision of the econometric estimation.

7.3 Which Policy Synergies Are More Likely Improve Nutrition in Tunisia?

This section uses stunting, measured by the HAZ score, as the dependent variable capturing child malnutrition. The sample analyzed includes observations of children aged 0–24 months. Table 23 reports the effects of food, health-, WASH-, and care-related interventions on child stunting. As indicted above, each of these dimensions has individual and combined—or interaction–effects that are reported separately. Thus, for example, the coefficient "adequate in WASH only" captures the effect—correlation—across Tunisian children of moving from no adequacy on WASH access to achieving adequate access to those services. That is, this effect quantifies the nutritional benefit of providing adequate access to WASH to all those Tunisian households that currently lack it. The same effect is estimated for each of the other dimensions considered. Beyond these individual effects, other variables capture the effects of achieving, say, WASH adequacy when households benefit from one, two, or three other adequacies. That is the case of, for example, adequate WASH access and adequate food access. Those estimates include the effects of the specific satisfied adequacies plus the interaction or synergy

effects of having achieved these two adequacies. Results specific to WASH adequacies (table 23) are then compared with the correlations estimated for other dimensions that do not include WASH (that is, food, environmental health, and care adequacies; table 23).

Results shown in table 23 confirm that adequacy on any single dimension is not sufficient to make a (statistically) significant impact on nutritional status. This is not only true for WASH, but also for food, environmental health, and care. The findings hold across samples of poor, nonpoor, urban, and rural households. Only multiple adequacies are correlated with—statistically—significant improvements in children's nutritional status. Results also show that not *any* combination of adequacies will lead to significant improvements in child stunting. In fact, significant sets of integrated interventions vary across types of households (poor versus nonpoor, rural versus urban) and, for some households, such as urban households, none of the combinations of these integrated interventions appear to lead to significant improvements in child stunting.[48]

Importantly, adequate water and sanitation combined with adequate food and health access have positive correlations with improvements in children's nutritional status for the full sample (table 23). In rural areas, adequate WASH and health access are correlated with significant child HAZ score improvements. For nonpoor households, adequate WASH and food access have positive and significant effects. For the poorest quartile of rural households, positive and significant improvements in nutrition are only observed when adequate access to food, health, WASH, and care are all present (table 23).

Interestingly, the vast majority of coefficients reported for WASH have a positive sign, even though they are not significant. This indicates that WASH and other interaction effects may still be positively correlated with nutrition even though the magnitude of such effects is not sufficiently large to lead to significant effects. Adequacies other than WASH (see lower panel in table 23) show similar results; while their synergy effects are positively correlated with improved child nutrition, these effects are not statistically significant. This is true for all considered samples. It is only when combined with adequate access to WASH services that some specific effects of other dimensions become significant.

Table 23. Effects of Food, Health, WASH, and Care Adequacies on Child Nutrition in Tunisia, 2011–12

Adequacies	Full	Urban	Rural	Poor	Nonpoor	Rural quart1
Adequate in: WASH only	0.166	0.285	-0.291	0.009	0.088	-0.455
	[0.330]	[0.568]	[0.433]	[0.459]	[0.481]	[0.485]
Adequate in: WASH and Care only	0.343	-0.078	0.668	0.429	0.124	0.283
	[0.551]	[0.833]	[0.768]	[1.028]	[0.696]	[0.990]
Adequate in: WASH and Food only	1.892**	1.626	2.147		1.642*	
	[0.800]	[0.990]	[1.704]		[0.876]	
Adequate in: WASH and Health only	0.558*	0.270	0.818**	0.242	0.382	0.089
	[0.284]	[0.524]	[0.350]	[0.398]	[0.431]	[0.421]
Adequate in: WASH, Care and Food only	0.262	0.827	-0.168	0.504	-0.030	-0.495
	[0.793]	[1.297]	[0.998]	[1.079]	[1.128]	[1.604]
Adequate in: WASH, Care and Health only	0.089	-0.381	0.613	0.055	-0.121	0.135
	[0.353]	[0.588]	[0.486]	[0.647]	[0.490]	[0.703]
Adequate in: WASH, Food and	0.278	0.140	0.167	0.993	-0.059	0.504

[48] This is because of the already very low levels among children in urban areas, which make additional improvements toward eradication harder to achieve.

Health only	[0.383]	[0.609]	[0.576]	[0.748]	[0.516]	[0.901]
Adequate in: WASH, Care, Health and Food only	0.447	0.628	-0.166	-0.140	0.334	-1.621
	[0.450]	[0.686]	[0.663]	[0.937]	[0.579]	[1.056]
Adequate in: Food only	0.071		0.161	0.265		0.119
	[0.933]		[0.936]	[0.911]		[0.880]
Adequate in: Health only	0.346	0.314	0.346	0.248	0.378	0.131
	[0.332]	[0.615]	[0.391]	[0.428]	[0.501]	[0.440]
Adequate in: Care only	-1.029		-0.938	-0.905	0.317	-1.051
	[0.714]		[0.724]	[0.724]	[3.298]	[0.703]
Adequate in: Care and Food only	1.306		1.397	1.501		1.355
	[2.288]		[2.263]	[2.174]		[2.082]
Adequate in: Care and Health only	-0.331	-0.188	-0.283	-0.210	-0.325	-0.357
	[0.423]	[1.137]	[0.464]	[0.488]	[0.813]	[0.495]
Adequate in: Food and Health only	0.823		0.913	1.017		0.871
	[0.976]		[0.978]	[0.950]		[0.917]
Adequate in: Care, Food and Health only	0.313	-1.059	0.690	0.898	-0.755	0.752
	[0.831]	[1.841]	[0.922]	[0.965]	[1.470]	[0.931]
Constant	-0.436	-0.211	-0.527	-0.631*	-0.187	-0.485
	[0.274]	[0.517]	[0.320]	[0.346]	[0.423]	[0.353]
Observations	988	548	440	306	682	254
R-squared	0.025	0.018	0.062	0.029	0.017	0.046

Source: Authors' estimates based on MICS 2011–12.
Note: Using adequate WASH access definition 1.

When using a stricter definition of WASH adequacy that includes safe removal of child feces to improved water and sanitation, adequate access still brings significant and positive correlations with improved child nutrition (table 24). But as this adequacy on WASH becomes harder to achieve, effects become significant only when environmental health adequacy is also achieved. In fact, no other synergy appears significant. And this positive correlation appears strong even as it manifests among the most disadvantaged groups, that is, the poor, rural, and poorest quartile of rural households. In this case, adequacies of food and health have a statistically positive effect on child nutrition on their own (table 24), with differences observed among urban and rural, poor and nonpoor, and poorest quartiles of the distribution. Appropriate care does not appear to have a significant effect on improving nutrition, except when its adequacy complements that of environmental health in the urban sample. This turns out to be the only synergy that reduces stunting among Tunisian households. Appendix 9 shows the implications of using even more demanding definitions of adequacy.

In conclusion, adequate access to basic services matters in understanding improved child nutrition in Tunisia. WASH has a (statistically significant) positive link with improved child nutrition: more and better access to (improved) water and sanitation and nonshared toilets are likely to have significant beneficial effects on child nutrition. In fact, this adequacy is the one more likely to have a significant impact on nutrition compared to adequate access to food, health, and care. Further, estimated effects differ across samples of poor, nonpoor, urban and rural, and poorest quartiles of rural households. Finally, as the definition of adequacy becomes stricter, its statistical significance falls because fewer households meet such conditions, therefore impacting the quality and precision of estimates.

For policy purposes, two key messages stand out. In Tunisia, progress toward satisfying a very strict level of adequacy in any single dimension of public services may not bring the expected gains in child nutrition unless similar gains in other services are also attained. Unbalanced investments in WASH—or for that matter, food, care, or health—might not bring visible and substantive nutrition benefits. Yet, there is not a single package of WASH improvements combined with a single other intervention that will bring uniform benefits across different types of households. Effects of improved access vary by group and area: unsurprisingly "more everywhere" may not be the best policy option in the presence of limited resources to ensure improvements in nutrition for those most in need, especially Tunisian children.

Finally, these findings accrue from correlations rather than unambiguous causal effects. More analysis is needed on synergies between drivers of nutrition not included so far among the services considered—because they are not captured by the MICS—or other interventions such as public awareness campaigns, improved education among future parents, and so forth. More effort is also needed to disentangle endogenous relationships; after all, investments are expected to be (even desired to be) targeted toward those most in need, that is, among groups and areas most lagging in adequate access. Another area for further work is the estimation of correlations of adequate services to other health dimensions, for example, weight-for-age or the incidence of child diarrhea. So, even though the analysis in this section is clearly incomplete, it suggests that single, sectoral interventions are not sufficient to solve complex, interrelated, and multidimensional challenges. Neither are universal policies that do not separate the specific needs of different types of households, locations, and vulnerabilities.

Table 24. Effects of Food, Health, WASH, and Care Adequacies on Child Nutrition in Tunisia, 2011–12

Adequacies	Full	Urban	Rural	Poor	Nonpoor	Rural quart1
Adequate in: WASH only	-1.182	-0.985	-1.023	-1.097	0.430	-0.998
	[1.059]	[2.036]	[1.237]	[1.054]	[3.450]	[1.128]
Adequate in: WASH and Health only	0.897*	0.273	1.945**	1.852**	0.501	2.220**
	[0.492]	[0.602]	[0.879]	[0.912]	[0.585]	[0.941]
Adequate in: WASH and Care and Health only	0.873	0.374	1.654		0.697	
	[1.147]	[1.368]	[2.133]		[1.176]	
Adequate in: WASH, Food and Health only	1.503		1.861	1.780		1.885
	[1.509]		[1.504]	[1.420]		[1.369]
Adequate in: WASH, Care, Food and	-1.563	-1.896			-1.740	
	[3.061]	[3.088]			[3.125]	
Adequate in: Food only	0.997*	1.380	0.718	0.208	1.576**	0.313
	[0.595]	[0.871]	[0.813]	[0.864]	[0.792]	[0.837]
Adequate in: Health only	0.378**	0.020	0.787***	0.135	0.312	0.230
	[0.169]	[0.232]	[0.251]	[0.278]	[0.216]	[0.302]
Adequate in: Care only	-0.269	-0.324	-0.066	-0.560	0.063	-0.454
	[0.417]	[0.688]	[0.526]	[0.574]	[0.580]	[0.562]
Adequate in: Care and Food only	0.224	0.580	0.195	0.631	-0.096	0.379
	[0.724]	[1.208]	[0.903]	[0.941]	[1.064]	[1.260]
Adequate in: Care and Health only	-0.215	-0.655*	0.235	-0.192	-0.248	-0.042
	[0.241]	[0.350]	[0.333]	[0.369]	[0.311]	[0.387]

Adequate in: Food and Health only	0.140	-0.107	0.326	0.808	-0.126	0.641
	[0.303]	[0.388]	[0.497]	[0.611]	[0.357]	[0.699]
Adequate in: Care and Food and	0.305	0.323	0.227	0.304	0.217	-0.069
Health only	[0.361]	[0.491]	[0.532]	[0.661]	[0.432]	[0.692]
Constant	-0.297*	0.036	-0.654***	-0.573**	-0.120	-0.679***
	[0.154]	[0.216]	[0.220]	[0.230]	[0.201]	[0.246]
Observations	988	548	440	306	682	254
R-squared	0.021	0.019	0.044	0.038	0.018	0.044

Source: Authors' estimates based on 2011–12 MICS.
Note: Using adequate WASH access definition 2.

Appendix 1: Poverty Measurement in Tunisia

INS defined poverty lines for the first time in 1980 on the basis of standard, basic nutritional caloric needs. A unitary value per caloric intake was calculated for each household in a reference group (the poorest quintile) based on its estimated caloric intake and the household's food consumption monetary value. By multiplying the median of unitary value per calorie and the average total calories consumed by households in the poorest quintile, a food poverty line was defined. The total poverty line was then estimated by dividing the poverty food line by the share of food in total expenditures of the reference group. The approach was applied separately for urban and rural areas, resulting in an urban poverty line that was 63 percent higher than the rural line. Keeping that ratio constant over time, the two 1980 poverty lines were adjusted by the same CPI (that is, without any further geographical adjustment).

Analysts (Ayadi et al. [2005] and references there) have argued that the estimated value of food from the reference group turned out to be much higher in urban than in rural households, and that the share of nonfood consumption was also higher among urban than among rural households in the reference group. This typically resulted in an overestimation of the urban poverty line in the INS method and a resulting lower incidence of poverty among urban households. Therefore, the choice of the reference group and even the choice of year, 1980, a year with historically high levels of poverty, were both decisions with serious methodological consequences.

The **World Bank approach** adjusts the reference group used by INS and uses the poor in 1990 (as defined by the INS method) instead of the first quintile of the population in 1980 as reference. Caloric unit values and food poverty lines are estimated following the same procedure used by INS for urban and rural areas. The ensuing gap between urban and rural food poverty lines, however, narrows down to 18 percent (instead of the 63 percent obtained by the INS approach). A second difference from the INS method is that the food share of total consumption is now estimated econometrically—ordinary least squares—using an Engel equation for each area. In the Engel equation, the share of food is regressed on the ratio of total expenditures to the food poverty line (in log), this same ratio squared and on the difference in size between each household and the average household of the reference group. This equation is estimated separately for the two areas. The estimated constant of the model (α) represents the food share of the household having an income just equal to the food poverty line. Once this food share of the total poverty line is estimated, the total poverty line simply adds to the food component the resulting nonfood component. Empirically, this methodology results in a smaller nonfood share in urban areas and a higher share in rural areas than the INS method produced based on the observed shared of food over total spending by the household (table A1.1).

Table A1.1. Poverty Lines in Tunisia

	Unit value (rural=100)		Food poverty line (in TND)		Food share		Poverty line (in TND)		(rural = 100)	
	INS	WB	INS	WB	INS	WB	INS	WB[a]	INS	WB
Urban	163	118	150	160	0.54	0.55	278	218	200	118
Rural	100	100	89	134	0.64	0.61	139	185	100	100

a. In 1990 the exchange rate was TD 0.878 to the U.S. dollar. This implies a WB poverty line of US$248 for the urban areas and US$210 for rural areas. With adjustment forward at the CPI up to 2000, these lines are estimates at TD 341 and TD 294, respectively, for the two areas. In terms of PPP U.S. dollars, these amounts correspond respectively to about US$2 and US$1.8 per capita per day. The upper poverty lines are respectively US$2.9 and US$2.3 for the year 2000 (PPP 1993).

The joint methodology, produced in 2012 by the INS, the African Development Bank, and the World Bank (2012), follows by and large the World Bank methodology explained above. It defines the cost of a calorie for the reference group, once again the bottom quintile of the population. It then estimates the food poverty line for each strata defined no longer as urban and rural, but as cities; small-and-medium towns; and communal areas. It does so by multiplying the median unitary cost of the reference group by its

average energy consumption. This food poverty line for each strata is used to estimate the share of food consumption on total consumption of those households whose total consumption is equal to the food poverty line. This share is estimated through a quantile regression of the Engel equation. This share determines the food component of the total poverty line, while the remaining share determines the nonfood component (table A1.2). The resulting total poverty line is considered a "lower-bound" poverty line since it is evaluated at a level of consumption (total consumption equals food poverty line) that is considered a survival level. When the same analysis is repeated for households whose food consumption (rather than total consumption) is around the food poverty line, the resulting total poverty line is considered an "upper-bound" poverty line (table A1.3).

An additional difference between the methodologies lies in the very definition of consumption. The joint methodology excludes from the consumption aggregate those expenditures related to the purchases of housing (which was included in the previous methodologies) and cars, major repairs, key assets, and occasional ceremonies. Imputed rent is estimated according to a regression model, instead of the average by stratum reported among renters as in the previous methodologies.

Table A1.2. Estimated Shared of Food Component of Poverty Line by Stratum

	Share of food component (α)		Budgetary share of households whose food expenditures are exactly equal to the poverty lines	
	2005	2010	2005	2010
Cities	0.433	0.415	0.389	0.374
Small and medium towns	0.475	0.426	0.429	0.401
Noncommunal	0.528	0.468	0.491	0.454

Source: INS, ADB, and World Bank (2012).

Table A1.3. Poverty Lines in Tunisia by Stratum, Lower and Upper Bound

	Poverty line			Upper poverty line		
	2000	2005	2010	2000	2005	2010
Cities	534	615	757	902	1038	1277
Small and medium towns	518	596	733	818	941	1158
Noncommunal	405	466	571	581	669	820

Source: INS, ADB, and World Bank (2012).

Appendix 2: Modeling Consumption in Tunisia

The projections that use survey-to-survey imputation methods relied on the definition and estimation of a prediction model for household consumption. Using data from the ENBCV 2010, an ordinary least squares (OLS) regression was estimated that used the logarithm of annual consumption per capita (in millimes) as the dependent variable. The regressors included a series of demographic, location, labor, access to services, and asset ownership variables that could be found consistently across the "source" survey (that is, ENBCV 2010), survey A, and the "destination" surveys, survey B (that is, 2009 and 2012 ENPEs). The results from the OLS regression are shown in table A1.1.

The results from the consumption model provide a good fit and reliable predictions of household consumption when paired with a process that would randomly assign an error term to the prediction of household consumption. Figures A1.1 and A1.2 show the superposition of the actual household consumption found in the ENBCV 2010 and the predictions based on the consumption model and two methods to randomly assigned error terms to complement the prediction: a decile-specific random assignment and a fully random assignment. The first process assigns an error term to the household consumption prediction that is randomly obtained from the same wealth decile to which the household belongs. Wealth deciles are based on an asset-based index obtained from a principal component analysis.

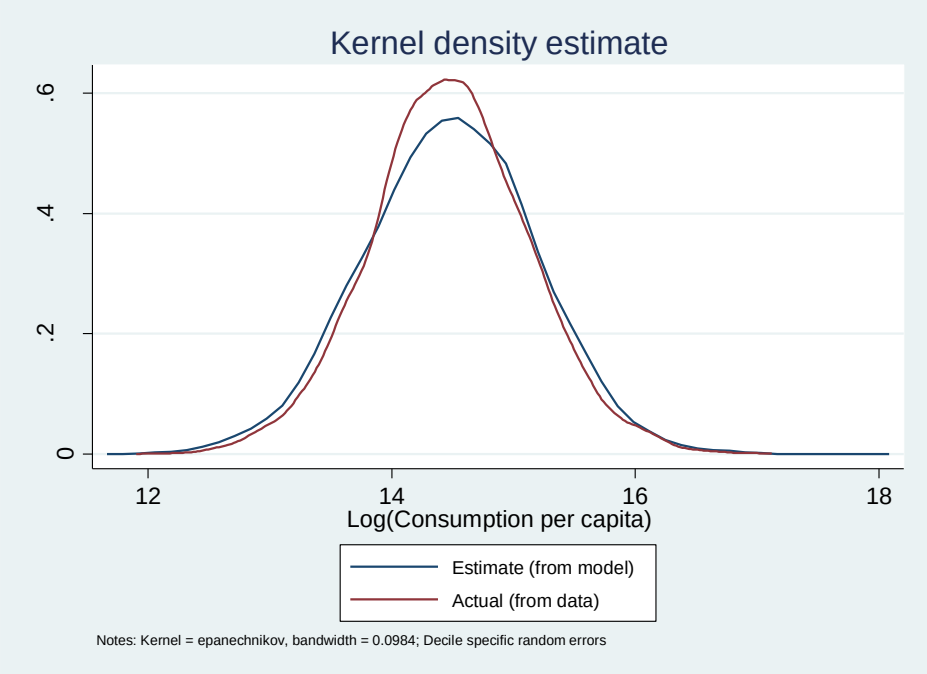
Table A2.1. Consumption Model Used for Prediction

Dependent variable: Log(annual consumption per capita, *millimes*)	
Controls	
Household size	-0.324***
	(0.010)
Household size squared	0.014***
	(0.001)
Log of household head age	0.327
	(0.558)
Log household head age squared	-0.010
	(0.071)
Indicator: household head is male	0.018
	(0.024)
Indicator: household head is married	0.049**
	(0.022)
Indicator: household head is unemployed	-0.262***
	(0.033)
Dependency rate	-0.188***
	(0.024)
Indicator: household head's education: *primary*	0.120***
	(0.014)
Indicator: household head's education: *secondary*	0.326***
	(0.017)
Indicator: household head's education: *university*	0.655***
	(0.022)
Indicator: household head works in agriculture	-0.014
	(0.016)

Region indicator: Northeast	-0.153***
	(0.025)
Region indicator: Northwest	-0.349***
	(0.028)
Region indicator: Center east	0.041*
	(0.024)
Region indicator: Center west	-0.345***
	(0.033)
Region indicator: Southeast	-0.085***
	(0.031)
Region indicator: Southwest	-0.249***
	(0.031)
Number of household members who are unemployed^{+}	-0.079***
	(0.008)
Number of household members who attended *primary*$^{+}$	0.061***
	(0.006)
Number of household members who attended *secondary*$^{+}$	0.125***
	(0.007)
Number of household members who attended *university*$^{+}$	0.189***
	(0.010)
Indicator: Rural location	-0.201***
	(0.021)
Constant	14.347***
	(1.095)
Observations	11,280
R-squared	0.513

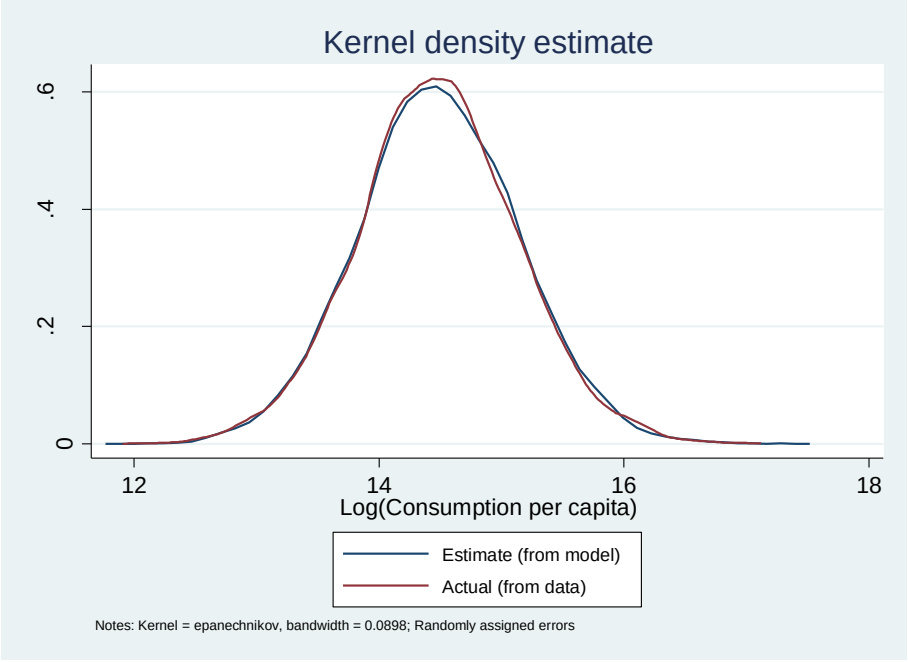
Source: World Bank staff calculations using the ENBCV 2010.
Notes: Standard errors in parenthesis. $^{+}$ Includes all household members but the household head. Indicators refer to a binary variable taking the value 1 when the criteria is met and 0 otherwise. *** p<0.01, ** p<0.05, * p<0.1.

Figure A2.1. Actual and Estimated Consumption, Decile-Specific Error Assignment



Source: World Bank staff calculations using the ENBCV 2010.

Figure A2.2. Actual and Estimated Consumption, Random Error Assignment



Source: World Bank staff calculations using the ENBCV 2010.

Appendix 3: Poverty Profiles' T-Tests

Table A3.1. Statistical Difference Mean Tests, Poor versus Nonpoor, 2005–12

	2005 Poor	2005 NP	T-test #1 2005 P vs NP	2010 Poor	2010 NP	T-test #2 2010 P vs NP	T-test #3 2010 P vs 2005 P	T-test #4 2010 NP vs 2005 NP	2012 Poor	2012 NP	T-test #5 2012 P vs 2010 P	T-test #6 2012 NP vs 2010 NP
I. Sociodemographics												
1.Household size	6.43	5.06	-66.02	6.15	4.90	-52.35	9.65	11.53	5.78	4.51	-172.90	-479.83
2. No. of rooms per capita	0.42	0.74	92.76	0.45	0.77	70.03	-8.74	-6.87	0.47	0.79	85.66	85.82
3a. Education of household head (% of households with heads attending:												
None	43.66	31.43	-24.77	43.53	26.24	-28.63	0.19	15.65	41.64	21.68	-33.24	-226.90
primary	43.16	32.72	-20.95	44.38	36.67	-12.42	-1.71	-11.01	46.16	36.95	31.01	12.34
Secondary	12.59	27.34	39.00	11.87	28.01	36.09	1.52	-1.94	11.70	30.33	-4.45	108.38
Tertiary	0.59	8.51	45.17	0.22	9.09	49.26	4.25	-2.44	0.50	11.04	40.87	137.94
4. Age of household head (% households with heads aged:												
15–24	0.08	0.26	5.07	0.20	0.11	-1.61	-1.96	4.91	0.34	0.73	23.21	205.22
25–39	18.43	15.54	-7.39	16.09	13.29	-6.19	4.37	8.50	22.00	18.38	131.82	296.19
40–64	65.83	63.06	-5.69	65.68	66.10	0.71	0.22	-8.43	60.89	63.62	-86.67	-110.30
65+	15.66	21.13	14.35	18.03	20.50	5.07	-4.40	2.07	16.78	17.27	-28.72	-175.30
Age, in years	50.12	52.67	19.17	51.59	53.72	12.85	-7.83	-10.48	49.94	51.36	-109.68	-387.04
5. Sex of household head												
Male	89.15	87.19	-6.06	87.35	89.64	5.61	3.90	-10.19	88.83	88.20	39.60	-96.96
Female	10.85	12.81	6.06	12.65	10.36	-5.61	-3.90	10.19	11.17	11.80	-39.60	96.96
6. Location												
Urban	53.01	68.95	32.44	49.79	68.53	30.46	4.53	1.26	43.56	71.53	-108.74	139.11
Rural	46.99	31.05	-32.44	50.21	31.47	-30.46	-4.53	-1.26	56.44	28.47	108.74	-139.11
7. Region												
Grand Tunis	14.23	25.37	27.23	13.56	24.97	22.55	1.23	1.15	9.66	26.09	-105.55	54.44
Northeast	12.90	14.25	3.83	9.27	14.79	14.08	8.07	-1.94	11.53	14.32	64.72	-28.34
Northwest	13.94	11.54	-7.07	19.10	10.11	-19.60	-9.75	6.65	21.72	9.53	56.77	-41.49
Center east	12.26	25.87	35.19	12.09	25.40	28.28	0.34	1.39	10.08	25.71	-55.71	15.28
Center west	27.14	9.46	-43.88	27.68	10.65	-33.90	-0.89	-5.98	32.40	9.66	89.74	-69.52
Southeast	11.46	8.57	-9.40	10.53	8.88	-4.49	2.13	-1.55	7.50	9.29	-91.66	30.58
Southwest	8.07	4.94	-14.47	7.77	5.21	-9.08	0.91	-2.10	7.12	5.40	-21.78	18.46
II. Labor												
8. Household head labor status (% of households with heads whose labor status is:												
Out of labor force	20.89	28.80	18.38	24.55	31.63	12.93	-6.08	-8.13	27.29	32.23	54.53	27.19
Unemployed	5.54	1.41	-19.53	5.18	1.49	-14.07	1.10	-0.82	5.34	1.56	5.96	12.93
Self-employed	25.94	26.38	1.00	22.56	24.24	3.21	5.62	6.62	n.a.[4]	n.a.[4]		
Salaried, private	38.40	23.92	-29.99	40.50	27.20	-21.83	-2.98	-9.87	n.a.[4]	n.a.[4]		
Salaried, public	9.09	19.38	31.33	7.21	15.43	24.35	5.02	13.75	n.a.[4]	n.a.[4]		
9. Number of household members other than head whose labor status is:												
Out of labor force	2.10	1.69	-28.73	2.07	1.71	-20.33	1.20	-2.57	1.79	1.52	-177.06	-331.30
Unemployed	0.26	0.20	-10.39	0.37	0.27	-10.36	-9.81	-16.84	0.32	0.25	-55.92	-71.00
Self-employed	0.29	0.30	1.32	0.18	0.19	1.72	11.85	23.18	n.a.[4]	n.a.[4]	n.a.[4]	n.a.[4]
Salaried, private	0.37	0.46	11.70	0.39	0.47	8.83	-1.78	-2.33	n.a.[4]	n.a.[4]	n.a.[4]	n.a.[4]
Salaried, public	0.04	0.14	35.30	0.04	0.14	27.36	-0.79	-0.46	n.a.[4]	n.a.[4]	n.a.[4]	n.a.[4]
10. Sector of employment of household head (% of employed household heads that work in:												
Agriculture	32.73	20.92	-22.46	30.03	19.26	-16.38	3.58	4.80	33.64	15.80	55.92	-157.60
Industry	34.27	24.65	-17.30	39.10	27.66	-15.74	-5.80	-7.42	32.56	30.81	-98.41	120.03
Services	31.84	53.84	38.47	30.36	52.61	31.59	1.95	2.70	33.52	53.04	48.87	14.95
11. Household head's profession (for those working)												
Professional	5.11	19.98	42.89	4.99	19.61	36.08	0.33	0.95	3.41	16.90	-56.27	-121.57
Midlevel professional	1.85	7.53	26.32	1.34	7.38	24.98	2.34	0.65	1.56	6.40	12.83	-66.93
Office worker	6.94	13.54	19.05	6.18	12.98	16.95	1.78	1.76	12.76	19.06	165.68	287.81
Other	85.83	58.67	-56.70	87.49	60.00	-49.01	-2.86	-2.93	82.24	57.56	-106.59	-85.82
12. Work in Public Sector (Share of households wth…												

	2005 Poor	2005 NP	T-test #1 2005 P vs NP	2010 Poor	2010 NP	T-test #2 2010 P vs NP	T-test #3 2010 P vs 2005 P	T-test #4 2010 NP vs 2005 NP	2012 Poor	2012 NP	T-test #5 2012 P vs 2010 P	T-test #6 2012 NP vs 2010 NP
working in public sector:												
Household members (other than head)	0.13	0.34	44.86	0.12	0.30	33.90	2.06	8.48	n.a.[e]	n.a.[e]		
Household he	12.79	28.38	34.90	11.22	23.72	25.27	2.95	11.61	n.a.[e]	n.a.[e]		
13. Dependency rate	0.45	0.35	-46.34	0.43	0.33	-35.35	6.89	12.79	0.44	0.33	22.90	2.43
III. Access to basic services												
14. Share of households with access to basic services (%):												
a. Tap water	70.13	87.25	40.28	65.80	87.24	38.43	6.55	0.04	62.61	89.06	-57.94	119.82
b. flush toilet	13.95	41.92	67.84	13.75	49.34	74.05	0.39	-19.60	n.a.[f]	n.a.[f]		
c. Electricity	96.66	99.34	17.39	97.92	99.72	11.61	-5.91	-8.37	98.53	99.62	39.81	-35.23
d. Sanitation[b]	35.33	56.37	42.28	34.91	60.79	42.78	0.61	-12.10	n.a.[f]	n.a.[f]		
e. Children start school on time:	92.17	96.01	2.98	95.31	96.98	1.27	-1.92	-1.15	n.a.[f]	n.a.[f]		
f. Children attend school	92.86	96.64	5.98	88.89	96.41	7.21	3.51	0.49	n.a.[f]	n.a.[f]		
g. Children finished sixth grade	57.50	72.97	11.60	57.09	77.69	11.44	0.21	-4.48	n.a.[f]	n.a.[f]		
IV. Asset ownership												
15. Share of households owning (%):												
a. Radio	41.30	52.19	21.62	32.10	48.84	28.14	13.49	8.87	43.33	69.28	203.29	901.81
b. Television	85.38	96.47	35.09	91.95	97.56	18.23	-15.51	-8.93	93.16	98.32	39.82	112.80
c. Refrigerator	71.11	92.92	53.27	82.59	96.71	33.22	-20.16	-24.48	85.17	96.22	60.84	-56.29
d. Car or motorcycle	8.02	30.73	66.38	7.66	29.42	55.20	0.94	3.70	14.86	34.81	201.79	245.08
e. Computer	0.97	13.07	59.12	2.34	25.17	76.06	-7.27	-38.98	n.a.[g]	n.a.[g]		
f. Phone	16.41	43.45	65.15	6.82	28.41	56.20	22.19	41.21	n.a.[g]	n.a.[g]		
g. Cell phone	39.79	66.27	53.65	72.76	85.13	22.92	-49.88	-60.11	n.a.[g]	n.a.[g]		
h. Freezer	1.83	4.11	14.38	1.21	5.95	26.06	3.86	-10.25	1.79	2.64	42.00	-348.53
i. Bicycle	6.05	6.44	1.55	3.60	4.62	4.32	8.17	10.54	3.49	4.64	-5.11	1.83
V. Consumption												
16. Monthly per capita household consumption	72.52	239.10	160.99	73.76	256.4	162.16	-3.63	-11.61	n.a.[h]	n.a.[h]		
17. Share expenditure on food	47.24	39.06	-64.20	40.24	32.46	-55.71	42.03	73.80	n.a.[h]	n.a.[h]		

Source: World Bank staff's estimates from ENBCV 2005 and 2010, and ENPE 2012

a. Category primary incomplete not reported here so reported categories in table do not add to 100%.

b. Sanitation refers to the household being connected to the sanitation network.

c. ENPE 2009 and 2012 do not report consumption nor make labor earnings information publicly available.

d. ENPE 2012 does not report self-employment and salaried status of the worker.

e. ENPE 2012 does not report public versus public nature of firm or activity of worker.

f. ENPE 2012 does not report access to water and sanitation services nor sufficient information for children's school access.

g. ENPE 2012 does not report ownership of assets such as computer, phone, and cell phone (which are, instead, provided by ENBCV 2005 and 2010).

h. ENPE 2012 does not report consumption nor make labor earnings information publicly available.

Appendix 4: Poverty Profile 2009

Table A4.1. Poverty and Bottom 40 percent Profiles, 2005–12

	2005 Poor	2005 B40	2005 NP	2009 Poor	2009 B40[3]	2009 NP	2010 Poor	2010 B40	2010 NP	Poor	2012 B40 [3]	NP
I. Sociodemographics												
1.Household size	6.43	6.19	5.06	6.07	5.63	4.76	6.15	5.79	4.90	5.78	5.30	4.51
2. No. of rooms per capita	0.42	0.46	0.74	0.47	0.54	0.75	0.45	0.52	0.77	0.47	0.57	0.79
3a. Education of household head (% of households with heads having attended:												
None	43.66	43.94	31.43	48.24	41.43	22.85	43.53	39.03	26.24	41.64	36.49	21.68
Primary	43.16	41.52	32.72	42.91	44.71	37.06	44.38	44.88	36.67	46.16	45.84	36.95
Secondary	12.59	13.69	27.34	8.56	13.12	29.30	11.87	15.38	28.01	11.70	16.50	30.33
Tertiary	0.59	0.85	8.51	0.28	0.74	10.80	0.22	0.72	9.09	0.50	1.17	11.04
4. Age of household head (% households with heads aged:												
15–24	0.08	0.14	0.26	0.52	0.49	0.82	0.20	0.14	0.11	0.34	0.37	0.73
25–39	18.43	18.04	15.54	19.75	18.25	17.96	16.09	14.85	13.29	22.00	19.87	18.38
40–64	65.83	63.87	63.06	63.88	63.75	65.48	65.68	65.01	66.10	60.89	61.24	63.62
65+	15.66	17.95	21.13	15.85	17.52	15.74	18.03	20.00	20.50	16.78	18.53	17.27
Age, in years	50.12	50.85	52.67	49.85	50.78	50.78	51.59	52.60	53.72	49.94	51.02	51.36
5. Sex of household head												
Male	89.15	88.83	87.19	88.55	88.78	89.53	87.35	89.08	89.64	88.83	88.41	88.20
Female	10.85	11.17	12.81	11.45	11.22	10.47	12.65	10.92	10.36	11.17	11.59	11.80
6. Location												
Urban	53.01	43.84	68.95	41.24	39.65	70.51	49.79	44.63	68.53	43.56	42.54	71.53
Rural	46.99	56.16	31.05	58.76	60.35	29.49	50.21	55.37	31.47	56.44	57.46	28.47
7. Region												
Grand Tunis	14.23	12.27	25.37	8.42	9.96	25.84	13.56	13.06	24.97	9.66	11.41	26.09
Northeast	12.90	14.44	14.25	10.96	14.69	14.65	9.27	13.49	14.79	11.53	14.91	14.32
Northwest	13.94	16.39	11.54	22.83	19.82	9.58	19.10	17.98	10.11	21.72	18.82	9.53
Center east	12.26	14.52	25.87	9.93	14.94	25.64	12.09	15.87	25.40	10.08	15.42	25.71
Center west	27.14	24.08	9.46	34.07	25.16	9.53	27.68	22.19	10.65	32.40	23.49	9.66
Southeast	11.46	10.49	8.57	6.51	8.26	9.51	10.53	9.73	8.88	7.50	8.78	9.29
Southwest	8.07	7.81	4.94	7.28	7.16	5.25	7.77	7.68	5.21	7.12	7.18	5.40
II. Labor												
8. Household head labor status (% of households with heads whose labor status is):												
Out of labor force	20.89	21.29	28.80	23.80	25.84	28.13	24.55	25.53	31.63	27.29	29.70	32.23
Unemployed	5.54	4.22	1.41	4.46	2.95	1.27	5.18	3.62	1.49	5.34	3.37	1.56
Self-employed	25.94	29.21	26.38	n.a.[4]	n.a.	n.a.[4]	22.56	25.46	24.24	n.a.[4]	n.a.[4]	n.a.[4]
Salaried, private	38.40	34.81	23.92	n.a.[4]	n.a.	n.a.[4]	40.50	36.57	27.20	n.a.[4]	n.a.[4]	n.a.[4]
Salaried, public	9.09	10.36	19.38	n.a.[4]	n.a.	n.a.[4]	7.21	8.80	15.43	n.a.[4]	n.a.[4]	n.a.[4]
9. Number of household members other than head whose labor status is:												
Out of labor force	2.10	2.00	1.69	1.85	1.80	1.64	2.07	1.99	1.71	1.79	1.72	1.52
Unemployed	0.26	0.25	0.20	0.31	0.28	0.22	0.37	0.36	0.27	0.32	0.30	0.25
Self-employed	0.29	0.34	0.30	n.a.[4]	n.a.	n.a.[4]	0.18	0.21	0.19	n.a.[4]	n.a.[4]	n.a.[4]
Salaried, private	0.37	0.40	0.46	n.a.[4]	n.a.	n.a.[4]	0.39	0.46	0.47	n.a.[4]	n.a.[4]	n.a.[4]
Salaried, public	0.04	0.04	0.14	n.a.[4]	n.a.	n.a.[4]	0.04	0.05	0.14	n.a.[4]	n.a.[4]	n.a.[4]
10. Sector of employment of household head (% of employed household heads that work in:												
Agriculture	32.78	35.11	20.92	37.02	33.98	16.14	30.03	32.18	19.26	33.64	30.39	15.80
Industry	34.33	30.41	24.65	32.48	31.87	30.12	39.10	32.96	27.66	32.56	32.62	30.81
Services	31.89	33.55	53.84	29.93	33.64	53.34	30.36	34.39	52.61	33.52	36.69	53.04
11. Household head's profession (for those working)												
Professional	5.11	6.17	19.98	5.62	7.05	18.75	4.99	6.49	19.61	3.41	4.84	16.90
Mid-level professional	1.85	2.21	7.53	1.56	2.23	6.98	1.34	1.92	7.38	1.56	2.41	6.40
Office worker	6.94	7.08	13.54	10.10	11.82	18.54	6.18	7.99	12.98	12.76	14.33	19.06
Other	85.83	84.20	58.67	81.37	77.74	55.01	87.49	83.60	60.00	82.24	78.39	57.56
12. Work in public sector (share of households with… working in public sector:												
Household members (other than head)	0.13	0.15	0.34	n.a.[5]	n.a.	n.a.[5]	0.12	0.15	0.30	n.a.[5]	n.a.[5]	n.a.[5]

	2005 Poor	2005 B40	2005 NP	2009 Poor	2009 B40[3]	2009 NP	2010 Poor	2010 B40	2010 NP	Poor	2012 B40 [3]	NP
Household head	12.79	14.30	28.38	n.a.[5]	n.a.	n.a.[5]	11.22	13.05	23.71	n.a.[5]	n.a.[5]	n.a.[5]
13. Dependency rate	0.45	0.44	0.35	0.43	0.39	0.32	0.43	0.39	0.33	0.44	0.40	0.33
III. Access to basic services												
14. Share of households with access to basic services (%):												
a. Tap water	70.13	69.13	87.25	63.96	70.76	89.52	65.80	70.05	87.24	62.61	70.56	89.06
b. Flush toilet	15.26	16.96	41.92	n.a.[6]	n.a.	n.a.[6]	13.75	25.19	49.34	n.a.[6]	n.a.[6]	n.a.[6]
c. Electricity	96.66	97.24	99.34	97.99	98.61	99.55	97.92	98.88	99.72	98.53	99.03	99.62
d. Sanitation[b]	35.33	31.13	56.37	n.a.[6]	n.a.	n.a.[6]	34.91	35.12	60.79	n.a.[6]	n.a.[6]	n.a.[6]
e. Children start school on time:	92.17	91.88	96.01	n.a.[6]	n.a.	n.a.[6]	95.31	96.26	96.98	n.a.[6]	n.a.[6]	n.a.[6]
f. Children attend school	92.86	92.98	96.64	n.a.[6]	n.a.	n.a.[6]	88.89	92.21	96.41	n.a.[6]	n.a.[6]	n.a.[6]
g. Children finished sixth grade	57.50	59.19	72.97	n.a.[6]	n.a.	n.a.[6]	57.09	64.72	77.69	n.a.[6]	n.a.[6]	n.a.[6]
IV. Asset ownership												
15. Share of households owning (%):												
a. Radio	41.30	42.56	52.19	61.97	69.17	84.35	32.10	37.36	48.84	43.33	51.29	69.28
b. Televisions	85.38	88.26	96.47	92.18	94.62	97.97	91.95	94.36	97.56	93.16	95.50	98.32
c. Refrigerators	71.11	76.12	92.92	80.64	87.21	95.64	82.59	89.01	96.71	85.17	90.25	96.22
d. Car or motorcycle	7.98	11.23	30.73	16.55	21.24	37.33	7.66	11.96	29.42	14.86	19.57	34.81
e. Computer	0.97	1.14	13.07	n.a.[7]	n.a.	n.a.[7]	2.34	4.49	25.17	n.a.[7]	n.a.[7]	n.a.[7]
f. Phone	16.41	17.92	43.45	n.a.[7]	n.a.	n.a.[7]	6.82	8.82	28.41	n.a.[7]	n.a[7]	n.a.[7]
g. Cell phone	39.79	45.93	66.27	n.a.[7]	n.a.	n.a.[7]	72.76	76.51	85.13	n.a.[7]	n.a[7]	n.a.[7]
h. Freezer	1.83	1.42	4.11	1.45	1.47	2.82[7]	1.21	1.82	5.95	1.79	1.67	2.64
i. Bicycle	5.71	5.28	6.44	5.75	6.55	7.96[7]	3.60	4.17	4.62	3.49	3.90	4.64
V. Consumption												
16.Monthly per capita household consumption	72.52	88.20	239.10	n.a.[8]	n.a.	n.a.[8]	73.76	104.51	256.40	n.a.[8]	n.a.[8]	n.a.[8]
17. Share expenditure on food	47.24	46.70	39.06	n.a.[8]	n.a.	n.a.[8]	40.24	38.79	32.46	n.a.[8]	n.a.[8]	n.a.[8]

Source: World Bank staff's estimates from ENBCV 2005 and 2010, and ENPE 2012.

a. Category primary incomplete not reported here so reported categories in table do not add to 100%.

b. Sanitation refers to the household being connected to the sanitation network.

c. ENPE 2009 and 2012 do not report consumption nor make labor earnings information publicly available.

d. ENPE 2012 does not report self-employment and salaried status of the worker.

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f. ENPE 2012 does not report access to water and sanitation services nor sufficient information for children's school access.

g. ENPE 2012 does not report ownership of assets such as computer, phone, and cell phone (which are, instead, provided by ENBCV 2005 and 2010).

h. ENPE 2012 does not report consumption nor make labor earnings information publicly available.

Appendix 5: Consumption Mobility in Tunisia

Table A5.1 presents the basic descriptive statistics of the pseudo-panel used to analyze poverty and consumption mobility in Tunisia, that is, the socioeconomic and geographical characteristics of synthetic household heads of the constructed cohorts. The average consumption per capita in the pseudo-panel is about US$222 per month, with a standard deviation (SD) of US$28.5 in 2005 PPP terms. Around 86 percent of individuals live in a household where the head is male, while the average age of household heads is almost 58 years old. About one-third of the synthetic cohorts live in rural areas, and 60 percent live in the coastal regions (Gran Tunis, northeast, and center east). On average, 30 percent of each cohort has a household head with only primary studies, and 26 percent has a household head with secondary studies or above. Agriculture is the largest employment sector across cohorts, employing on average 40 percent of individuals, whereas the services sector comes in second with 37 percent. The variable denoted as "wealth index" captures the quality of the living conditions of the households. The variable is computed using information about assets owned by the households including air conditioner, radio, television, dish, refrigerator, freezer, washing machine, oven, car or motorcycle, and bicycle. The index also includes dwelling characteristics such as access to electricity and tap water. This variable is constructed as a principal component that explains most of the variance of the characteristics mentioned above. While the actual values of the index are not too informative, lower (higher) values of the index allow to discriminate between households with lower (higher) expected wealth or living conditions.

Table A5.1. Summary Statistics

Variable	Observations	Mean	Standard deviation
Demographic characteristics			
Percentage of male individuals	46	0.50	0.51
Average age of individuals	46	49.14	20.41
Percentage living in rural areas	46	0.33	0.04
Percentage living in coastal region	46	0.60	0.04
Percentage of households with a male household head	46	0.86	0.12
Average household head age	46	57.78	8.48
Percentage of households whose heads have only primary studies	46	0.30	0.09
Percentage of households whose head have studies of secondary or above	46	0.26	0.10
Economic characteristics			
Percentage of individuals working in agriculture[a]	46	0.40	0.22
Percentage of individuals working in industry[a]	46	0.22	0.15
Percentage of individuals working in services[a]	46	0.37	0.15
Percentage with self-employed household heads	46	0.24	0.04
Percentage whose heads are wage workers	46	0.34	0.18
Percentage of individuals whose occupation is an office job	46	0.12	0.07
Percentage of individuals whose occupation is professional	46	0.11	0.07
Percentage of individuals whose occupation is mid-level	46	0.05	0.05
Wealth index score	46	-0.22	0.28
Welfare			
Average consumption per capita	46	7.42	0.95

Poverty rate	46	0.19	0.05
Change in Poverty Rate 2005–10	46	-0.06	0.04

Source: Authors' calculations using the ENBC 2005 and 2010.
Notes: Consumption per capita per day 2005 PPP terms. The wealth index score is obtained from the first component of a principal component analysis of household assets (air conditioner, radio, television, dish, refrigerator, freezer, washing machine, oven, car or motorcycle, and bicycle) and dwelling characteristics (electricity and tap water). Observations refer to the age group/gender cohorts created in the data. Primary studies refer to the Tunisian education level "enseignement de base." Secondary studies include secondary schools, "ecole métiers," "C.A.P," "B.T.P.," "apprentisage," "other professional formation," and "formation continue."
a. Only employed individuals are included in the calculation. All variables refer to data from 2005, with the exception of "change in poverty rate."

In terms of consumption mobility, that is, the extent to which levels of consumption in 2005 affected levels in 2010, table A5.2 reports a low unconditional income mobility estimate of 0.71 (that is, the relationship between past and current consumption without considering any control; see column 1). To put this estimate in context, Cuesta, Nopo, and Pizzolito (2011) find an unconditional mobility estimate as high as 0.966 for Latin America using data from the years 1992–2002. The estimated mobility changes substantially after controls are introduced. Column 2 introduces controls for location, demographic characteristics, and the living conditions of households (via the wealth index). By including such controls, the resulting estimate of income mobility (that is, conditional) is 0.555. The estimates show that the average level of education is statistically correlated with future consumption and that the higher the level of education of household heads, the higher the expected future consumption. Cohorts with older household heads are also expected to experience higher levels of consumption. Finally, the location does not seem to be related to future consumption and neither does the wealth index of individuals in the cohorts.

Columns 3, 4, and 5 include controls for sector of employment, professional situation and type of occupation, respectively. In all cases, it appears that individuals' labor market situations are not correlated with the level of future consumption once location and demographic characteristics have been accounted for. That is, holding other characteristics constant, the labor market composition of cohorts is not statistically related to the cohort's future expected consumption. Column 6 reports the results of a model that includes all variables simultaneously, confirming the results from previous estimates on the role of initial consumption, education, labor, location, service access, and asset conditions.

Table A5.2. Estimates of Time Dependence Consumption Mobility in Tunisia

	Dependent variable: Average consumption per capita in 2010					
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Average consumption per capita	0.710***	0.555**	0.418*	0.544**	0.643**	0.519**
	(0.108)	(0.216)	(0.213)	(0.221)	(0.241)	(0.235)
Percentage living in rural areas		5.899	7.248*	4.999	3.883	5.213
		(4.024)	(3.980)	(4.138)	(4.344)	(4.484)
Percentage living in coastal areas		6.730	8.584**	7.331	7.509*	7.360
		(4.188)	(4.069)	(4.446)	(4.372)	(4.508)
Average household head age		0.658***	0.808***	0.534**	0.697***	0.720***
		(0.217)	(0.215)	(0.242)	(0.232)	(0.248)
Average household head age squared		-0.004**	-0.006***	-0.003	-0.005**	-0.005**
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)

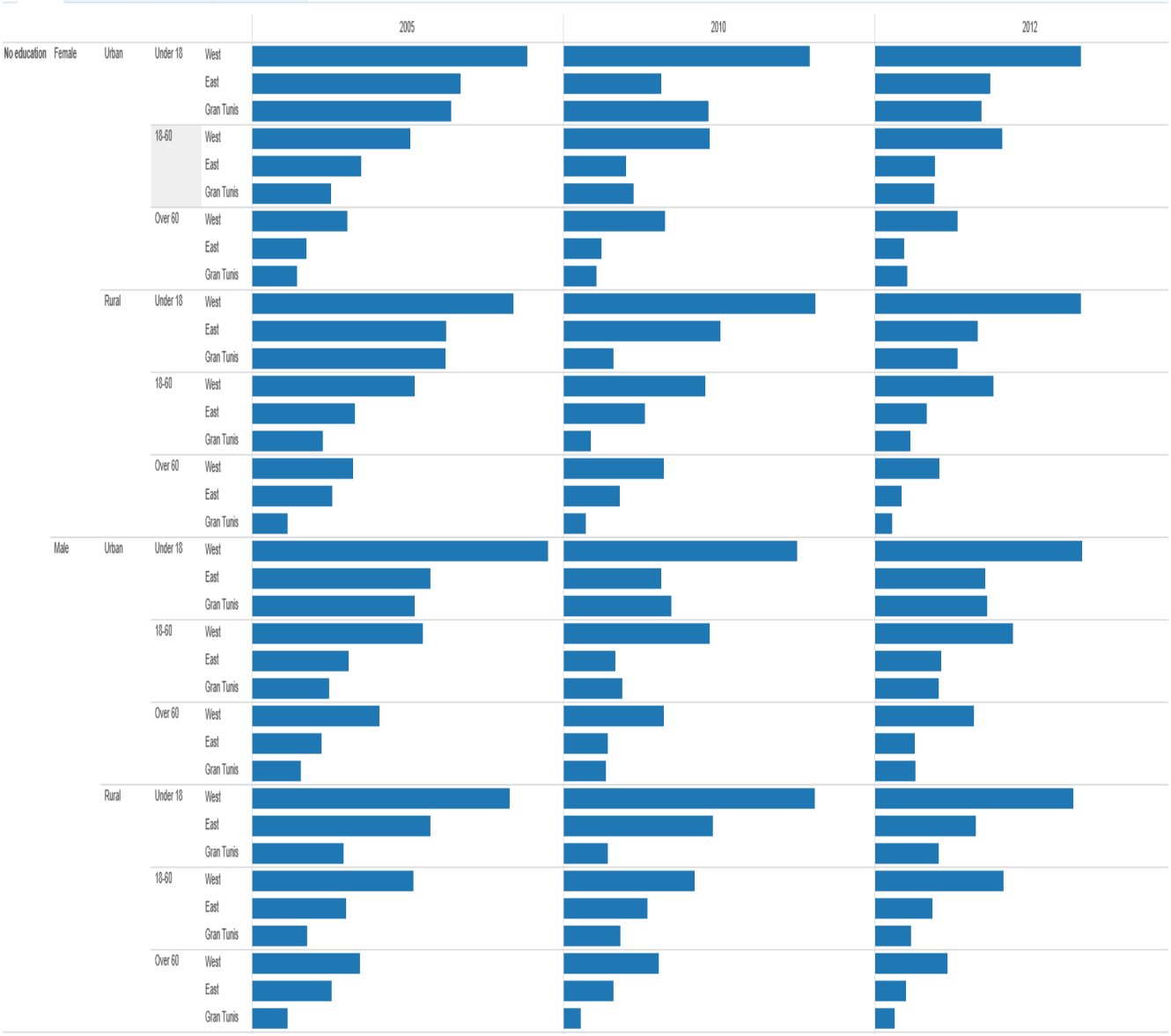
Percentage whose heads have only *primary* studies		7.012**	5.478**	7.312*	6.896**	6.201
		(2.674)	(2.615)	(3.995)	(2.793)	(4.162)
Percentage whose heads have studies of *secondary* or above		6.958***	7.635***	9.232**	8.093***	11.905**
		(2.088)	(2.117)	(4.383)	(2.311)	(4.940)
Wealth index score		0.483	0.411	0.227	-0.385	-0.358
		(1.161)	(1.122)	(1.201)	(1.353)	(1.401)
Percentage of households with a male household head		-1.457	-0.425	-2.590	-0.163	-0.283
		(1.314)	(1.374)	(1.628)	(1.676)	(2.198)
Percentage of individuals working in agriculture[a]			1.292			-0.740
			(0.994)			(2.075)
Percentage of individuals working in industry[a]			-0.975			-2.875
			(0.961)			(1.896)
Percentage with self-employed household heads				5.475		2.959
				(5.266)		(6.095)
Percentage whose heads are wage workers				-1.416		-2.446
				(3.136)		(3.342)
Percentage of individuals whose occupation is an office job[a]					-1.249	-2.091
					(1.404)	(2.104)
Percentage of individuals whose occupation is mid-level[a]					1.645	-0.645
					(2.235)	(2.833)
Percentage of individuals whose occupation is professional[a]					-2.551	-4.688*
					(2.084)	(2.545)
Constant	3.060***	-27.835***	-32.605***	-25.043***	-30.445***	-28.734***
	(0.804)	(7.690)	(7.592)	(8.059)	(8.339)	(8.820)
Observations	46	46	46	46	46	46
R-squared	0.498	0.807	0.836	0.816	0.818	0.858

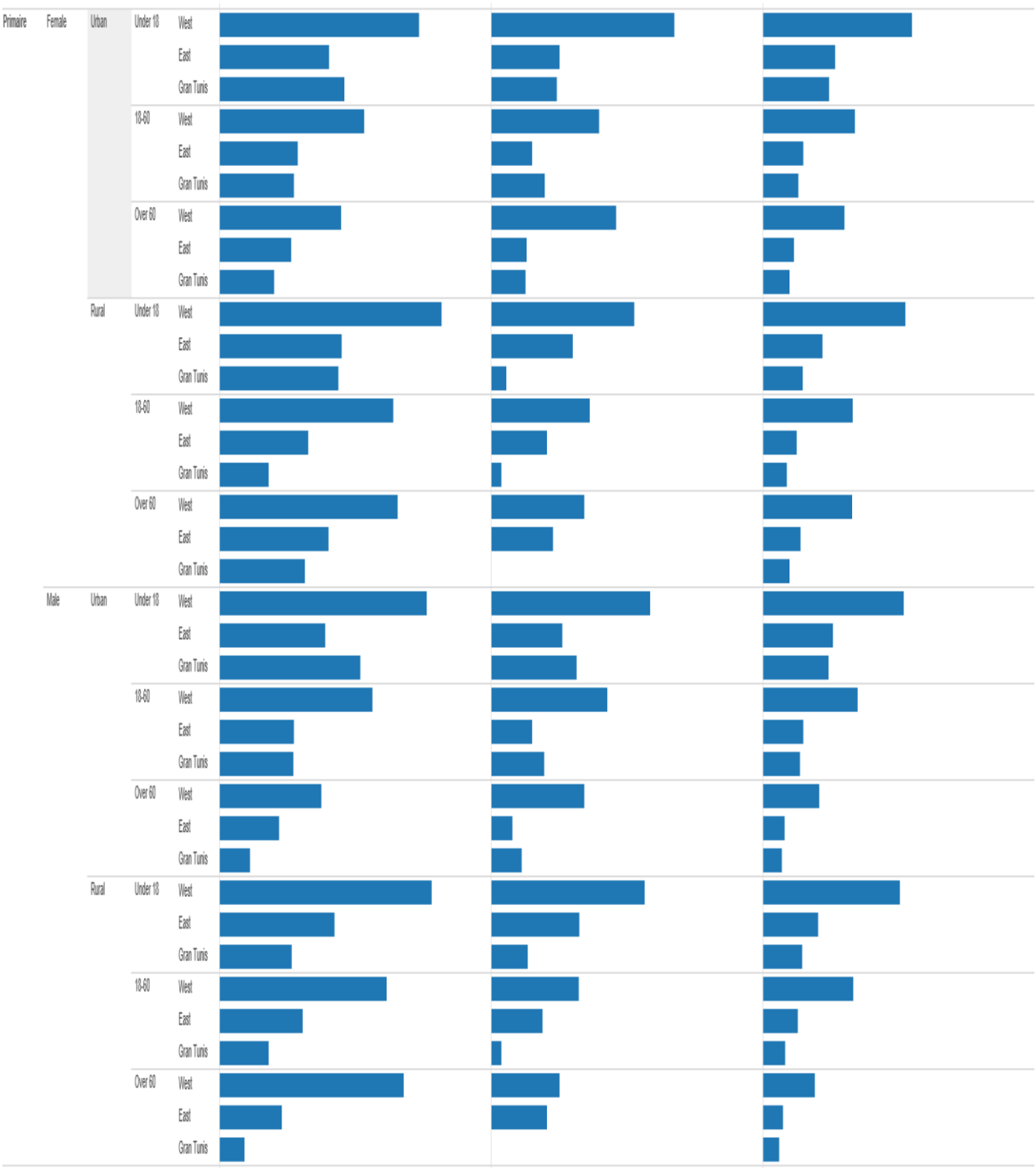
Source: Authors' calculations using the ENBCV 2005 and 2010.

Notes: Standard errors in parenthesis. Consumption per capita is expressed in 2005 PPP terms. Coastal areas include Gran Tunis, northeast, and center east regions. The wealth index score is obtained from the first component of a principal component analysis of household assets and dwelling characteristics. All regressors are calculated using 2005 data.

a. Percentages calculated among individuals who are working at the time of the survey. *** p<0.01, ** p<0.05, * p<0.1.

Appendix 6: HOI and Poverty Incidence in Tunisia




Primaire
Female
Urban
Under 18
West
East
Gran Tunis
18-60
West
East
Gran Tunis
Over 60
West
East
Gran Tunis
Rural
Under 18
West
East
Gran Tunis
18-60
West
East
Gran Tunis
Over 60
West
East
Gran Tunis
Male
Urban
Under 18
West
East
Gran Tunis
18-60
West
East
Gran Tunis
Over 60
West
East
Gran Tunis
Rural
Under 18
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East
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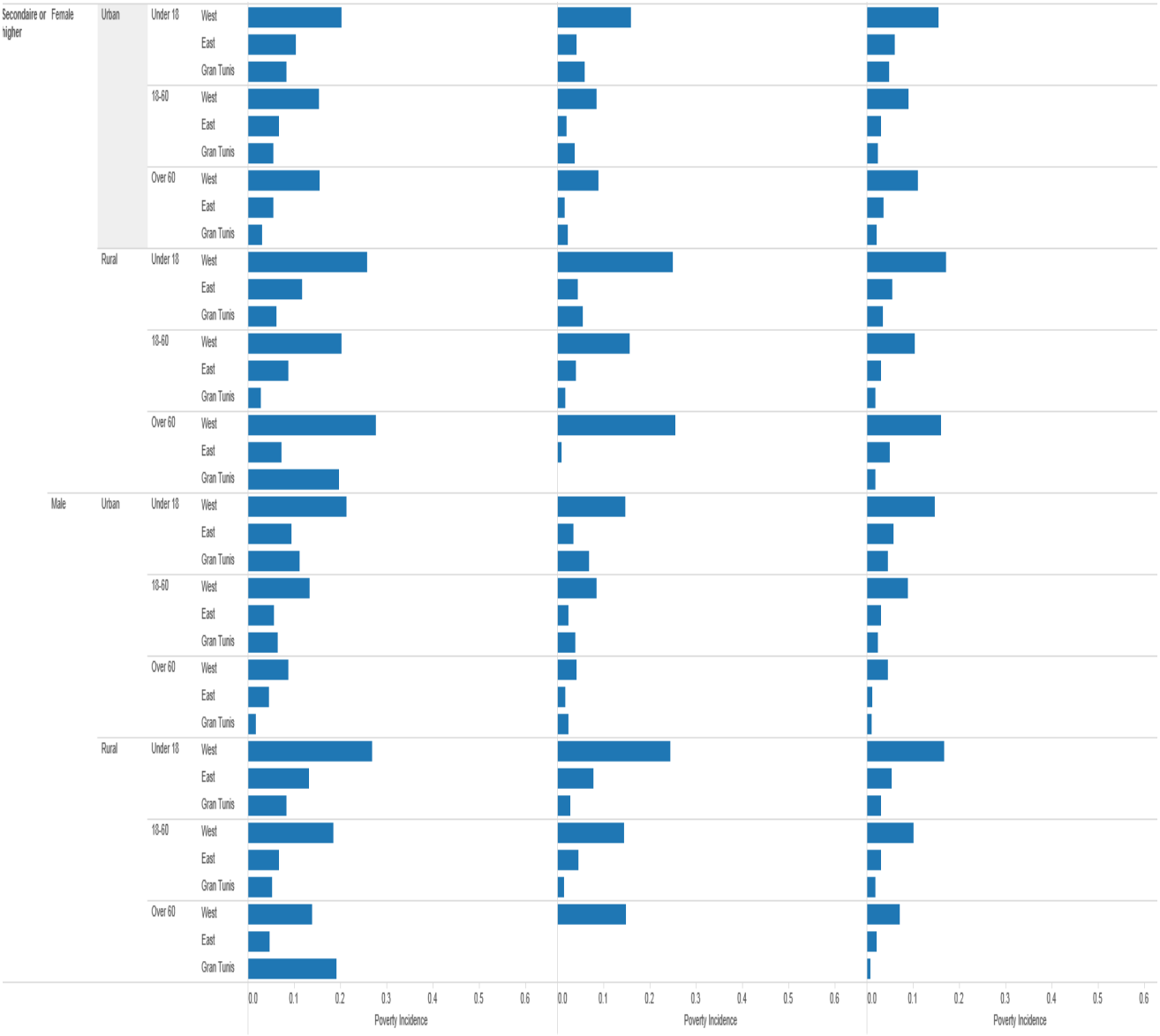
Over 60
West
East
Gran Tunis


Secondaire or higher
Female
Male
Urban
Rural
Under 18
18-60
Over 60
West
East
Gran Tunis
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Poverty Incidence

Appendix 7: Energy Consumption in Tunisia

The analysis simulates the fiscal and distributive effects caused by changes in the current structure of energy prices and subsidies. This analysis follows an earlier distributional study of energy subsidies in Tunisia using SUBSIM, a subsidy reform simulation methodology developed by Araar and Verme (2012). This present analysis, however, makes two contributions to the earlier analysis. First, it updates existing estimates (reported in World Bank 2013b) by including the most recent structure of energy prices and the most recent proposal of subsidy changes considered by the Tunisian government. Second, this analysis includes a detailed simulation of the distributional effects of alternative compensating cash transfer schemes financed from the fiscal savings accruing from the subsidy reform. The analysis uses consumption patterns in 2010. The latest input-output matrix (I/O) for Tunisia is also for 2010. This I/O matrix enables estimation of the indirect effects of the reforms; that is, the effects on household consumption and spending accruing from the impacts that energy prices have on other productive sectors of the economy. Household spending on energy and other products is then updated using successive rates of the annual Consumer Price Index (CPI), GDP, and population growth to construct a distribution of energy spending for January 2014. The current energy tariff structures are applied to that distribution of household *spending* on energy to derive a distribution of household *consumption* on energy sources. It is on these distributions of spending and consumption constructed for 2014 that the subsidy reform is simulated and its distributive and fiscal effects estimated. The first step before beginning the simulation analysis is to look at a detailed outline of the current system of energy subsidies.

To better understand the implications of the reforms, this appendix reports the most updated information on the socioeconomic patterns of energy subsidies, that is, how consumption, spending, and subsidy benefits of residential energy differ across different socioeconomic groups. Panels a and b in table A7.1 show that *total* consumption of energy across quintiles varies by energy sources. Richer quintiles consume more energy, with significantly large differences for gasoline and diesel among these quintiles and the rest. Consumption of the top two quintiles represents 80 percent and 90 percent of the consumption of diesel and gasoline, respectively. The bottom 40 percent consumes 2 percent and 8 percent of the total consumption of these two sources, respectively. For the other energy sources, the distribution of consumption across quintiles is not so skewed: the share of the top two quintiles (bottom 40 percent) consumption of LPG and electricity represents 45 percent to 52 percent (28–34 percent).

Table A7.1. Total Residential Energy *Consumption*, by Source and Quintiles of Household Consumption

a. Absolute terms

Quintile	Gasoline (million liters)	LPG (1,000s tons)	Diesel (million liters)	Electricity (GWH)
1 (poorest)	1	80	1	587
2	5	99	4	761
3	18	107	8	881
4	54	122	12	1033
5 (richest)	213	114	37	1440
Total	292	521	63	4702

b. Relative terms (in percent)

Quintile	Gasoline	LPG	Diesel	Electricity
1 (poorest)	0.3	15.3	1.6	12.5
2	1.7	18.9	6.8	16.2
3	6.3	20.5	12.9	18.7
4	18.7	23.4	19.4	22.0
5 (richest)	73.0	21.9	59.4	30.6
Total	100	100	100	100

Source: World Bank calculations using SUBSIM (subsidy simulations).

Similarly, when it comes to the per capita consumption of energy, the data in table A7.2 unequivocally confirm that the top consumption quintiles, the richest quintiles, consume much more than the poorest quintiles. Consumption differences are largest for gasoline, followed by diesel (panel a). On average, an individual from quintile 5 consumes 200 times more gasoline than someone from the poorest quintile. That ratio is still a whopping 38 to 1 in the case of diesel. Much narrower differences are observed for electricity and LPG. A richer individual consumes 4.5 times more electricity and 1.4 times more LPG than an individual from the poorest household. Individuals from the fourth quintile consume more LPG on average than anyone else in the distribution. When the analysis is conducted for households (panel b) —rather than individuals—very similar ratios and distributions are observed, confirming results for individuals.

Table A7.2. Per Capita and Per Household Consumption of Subsidized Energy, in Quantity

a. Consumption per individual

Quintile	Gasoline (liter)	LPG (kg)	Diesel (liter)	Electricity (kWh)
1 (poorest)	0.46	36.50	0.45	37.41
2	2.30	45.35	1.95	49.59
3	8.45	49.08	3.70	61.23
4	25.02	55.99	5.58	86.58
5 (richest)	97.74	52.39	17.07	167.20
Total	26.79	47.86	5.75	80.40

b. Consumption per household

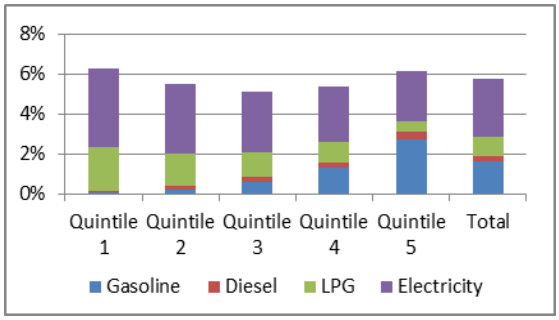
Quintile	Gasoline (liter)	LPG (kg)	Diesel (liter)	Electricity (kWh)
1 (poorest)	2.53	200.75	2.47	205.75
2	11.5	226.75	9.75	247.95
3	38.02	220.86	16.65	275.53
4	100.08	223.96	22.32	346.32
5 (richest)	342.09	183.36	59.74	585.2
Total	107.16	191.44	23	321.6

Source: World Bank calculations using SUBSIM.

In terms of expenditures, figure A7.1 shows that the expenditure of energy represents between 5 percent and 6 percent of households' total spending. In other words, energy spending as share of household total spending is similar across socioeconomic groups, without marked differences across quintiles. Despite being small, these differences are still interesting. In fact, it is the households in the poorest and richest quintiles that spend a higher proportion of their budgets on energy (just over 6 percent of their total spending). But while the poorest spent a larger share on electricity, the richest spent a larger share on gasoline.

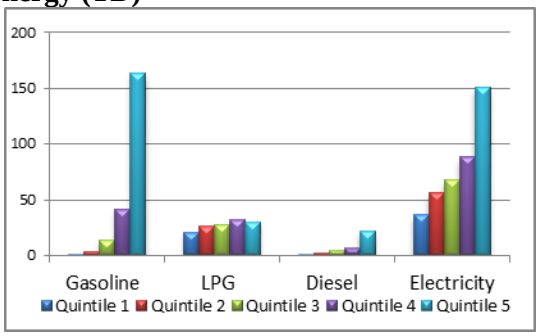
Large differences become evident when absolute spending is compared across quintiles of the consumption distribution. Figure A7.2 shows that the richest individual spends more than 200 times per capita than a poor individual. Socioeconomic disparities in spending exist for diesel as well, but are notably reduced for electricity and LPG. In fact, spending on LPG is more uniform across all socioeconomic groups, between TD 20 and TD 29, and it is the fourth quintile that spends the most.

Figure A7.1. Household Expenditure on Energy (TD)



Source: World Bank staff calculations using SUBSIM (subsidy simulations).

Figure A7.2. Per Capita Expenditures on Energy (TD)



Source: World Bank staff calculations using SUBSIM (subsidy simulations).

Appendix 8: Subsidy Energy Reform Impacts

Table A8.1. Impact of the Reform on Total per Capita Expenditures (by energy source and quintile of consumption, in TD)

a. Total effects

Quintile	Gasoline	LPG	Diesel	Electricity	All
Quintile 1	-1.9	-47.3	-5.9	-5.5	-60.5
Quintile 2	-3.7	-60.7	-10.3	-8.7	-83.5
Quintile 3	-6.3	-67.7	-14.7	-11.1	-99.7
Quintile 4	-11.1	-79.6	-19.8	-15.0	-125.5
Quintile 5	-28.1	-85.8	-36.2	-27.0	-177.1
Total	-10.2	-68.2	-17.4	-13.5	-109.3

b. Direct effects

Quintile	Gasoline	LPG	Diesel	Electricity	All
Quintile 1	-0.1	-44.5	-0.1	-3.7	-48.4
Quintile 2	-0.4	-55.3	-0.7	-5.6	-62.0
Quintile 3	-1.6	-59.9	-1.2	-6.8	-69.5
Quintile 4	-4.7	-68.3	-1.9	-8.8	-83.7
Quintile 5	-18.2	-63.9	-5.7	-15.1	-102.9
Total	-5.0	-58.4	-1.9	-8.0	-73.3

c. Indirect effects

Quintile	Gasoline	LPG	Diesel	Electricity	All
Quintile 1	-1.8	-2.8	-5.7	-1.8	-12.1
Quintile 2	-3.3	-5.4	-9.7	-3.1	-21.5
Quintile 3	-4.7	-7.8	-13.4	-4.4	-30.3
Quintile 4	-6.4	-11.3	-18.0	-6.2	-41.9
Quintile 5	-9.9	-21.9	-30.5	-12.0	-74.3
Total	-5.2	-9.8	-15.5	-5.5	-36.0

Source: World Bank staff calculations using SUBSIM (subsidy simulations).

Appendix 9: Access and Adequacy of Water and Sanitation Services in Tunisia

To analyze WASH services, the Tunisia diagnostic used categories from the MICS questionnaire, which offers consistent questions and options in terms of access and levels of services, grouping them into fewer sets for easier analysis. These categories are consistent with the standard definitions of the WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation (table A9.1). Thus, *improved drinking water source* refers to a drinking water source or delivery point that by nature of its construction or through active intervention is protected from outside contamination, in particular from contamination with fecal matter. They include: piped drinking water supply on premises; public taps/standposts; tubewell/borehole; protected dug well; protected spring; and rainwater. *Improved sanitation facility* refers to one that hygienically separates human excrement from human contact. It included the following facility types: flush or pour-flush toilets to piped sewer system, septic tank, or pit; ventilated improved pit latrine; pit latrine with slab; and composting toilet.

Table A9.1. UNICEF 2011–12 Multiple Indicator Cluster Survey
Water

MICS 2011/12	Like-with-like groupings
Piped into dwelling	Piped to premises
Piped to yard/plot	
Bottled water	Bottled water
Piped from the neighbor	Piped to neighbor/public
Public tap/standpipe	
Tube well or borehole	Tubewell/borehole
Protected well to yard	Protected well/spring
Protected spring	
Rainwater	Rainwater
Unprotected well to yard	Unprotected wells/springs
Unprotected spring	
Tanker truck	Tanker/cart
Cart with small tank	
Other	Other
River/dam/lake/ponds/stream/canal/irrigation channel	Surface water

Sanitation

MICS 2011/12	Like-with-like groupings
Flush to piped sewer system	Flush to piped sewer system
Flush to septic tank	Flush to pit, septic, or unknown
Flush to pit latrine	
Flush, don't know where	
Ventilated improved pit latrine	Pour-flush, composting toilet, or other improved
Pit latrine with slab	
Flush to somewhere else	Unimproved flush toilet/pit latrine
Pit latrine without slab/open pit	
Bucket toilet	Bucket/hanging toilet
Hanging toilet/latrine	
Missing	Other

No facility/bush/field	Open defecation

Bu the richness of the data collected in the MICS enables a very detailed analysis of Tunisia's water and sanitation services. In particular, by combining several questions, it is possible to get a better picture of the adequacy of the country's water and sanitation services. Such *adequacy* rates can better measure how protected the members of a household are from food insecurity due to poor WASH services. For instance, access to an improved water source without access to improved sanitation services may be as detrimental to health as only having an unimproved water source. Table A9.2 shows coverage rates for several WASH services taken separately, as well as adequacy rates that combine coverage rates across services. Only if a household is covered by a set of relevant services is it considered to have adequate WASH services. The groups of the population shown are based on location (urban/rural), poverty status (poor, nonpoor), and relative position in the wealth distribution (quartiles).

The first rows show patterns with high levels of improved water and improved sanitation when looking at the country as a whole, and among the urban population. Poverty status rather than location is a stronger predictor of limited access to improved water or sanitation services. Evidence shows that the urban poor tend to have much higher access rates than the rural poor, and higher than those experienced by the rural population as a whole. A crucial WASH-related behavior observed in the MICS is whether child feces are disposed of safely. This behavior is by far the least common among all household groups analyzed. While the full sample shows a rate of 1.9 percent, the urban poor seem to have the highest rate of 5.6 percent, and the second quartile has the lowest at 0.9 percent.

The last three rows of table A9.2 show different definitions of what could be considered adequate WASH services. Adequacy under definition 1 includes only having access to improved water, to improved sanitation service, and that the dwelling has a private toilet. The second definition also requires the safe disposal of child feces. The third definition further characterizes adequate access to include improved water as water that is piped, and adequate access to sanitation as being connected to sewage and septic tanks. Under definition 1, only 76.5 percent of Tunisian households are considered to have adequate WASH services, and most of the households with inadequate services are poor (46.5 percent adequacy) or rural (54.5 percent adequacy). It is remarkable that, when WASH behavior is taken into account, adequacy rates plummet to close to zero across all household groups. The urban poor group has the highest adequacy rate at 3.8 percent, and the third quartile is second at 2.5 percent. Among all the other categories analyzed, the adequacy rates are at or below 2 percent.

Table A9.2. WASH Profiles: Incidence of Water and Sanitation Services' Adequacy by Groups (%)

	Full sample	Urban	Rural	Poor	NP	Rural Poor	Urban Poor	Quartile 2	Quartile 3	Quartile 4
All improved water	93.8	99.6	86.3 ***	84.7	97.8 ***	81.9	98.1 ***	94.2 ***	99.6 ***	99.6
All improved sanitation	93.2	99.6	84.9 ***	78.1	99.9 ***	74.2	96.2 ***	100.0 ***	100.0	99.6
Piped improved water	54.9	62.7	44.7 ***	35.5	63.3 ***	29.0	66.0 ***	69.3 ***	73.6	46.2 ***
Sewage and septic tank sanitation	76.5	94.1	53.7 ***	43.5	91.0 ***	38.7	66.0 ***	81.3 ***	92.9 ***	98.7 ***
No shared toilets	87.2	96.2	75.6 ***	64.1	97.4 ***	60.1	83.0 ***	94.7 ***	98.3 ***	99.1
Child feces safely disposed of	1.9	1.8	2.1 ***	3.0	1.5	2.4	5.6	0.9 *	2.5	0.9
DEF 1: All improved water, all improved sanitation, no shared toilets, no child feces considered	76.5	93.5	54.4 ***	46.5	89.7 ***	39.5	79.2 ***	79.1 ***	92.5 ***	97.3 ***
DEF 2: All improved water, all improved sanitation, no shared toilets, and child feces safely disposed of	1.5	1.6	1.4	2.0	1.3	1.6	3.8	0.5*	2.5 *	0.9

DEF #: Sewage and septic tanks, piped improved water, no shared toilets, and child feces safely disposed of	1.0	1.6	2.3 ***	0.7	1.2	0.0	3.8	0.4	2.1	0.9

Source: Authors' estimates based on MICS 2011–12.
Notes: Quartiles are based on the distribution of a wealth index created with information on asset ownership. ***,**, and * refer to statistical significance levels of 1, 5, and 10 percent, respectively, on a test of means.

As the definition of adequate WASH access becomes even more restrictive and challenging to achieve (as compared with that used in tables 25 and 26 in the analysis)—now adequate WASH considers only the categories of piped water, sewage, and septic tanks as appropriate—hardly any households meet the adequate access level. This is particularly the case among rural households. This implies that attaining that level of adequacy does not have a statistically significant effect on improved nutrition among the analyzed households, as it is extremely rare that such a state is observed. Significant synergies are also rare, and hardly any significant correlations emerge. Instead, satisfaction of adequacies other than WASH becomes more statistically significant across the different samples considered. Again, food and environmental health adequacies have significant correlations on improved nutrition on their own, and follow a very similar pattern to that reported in table A9.3.

Table A9.3. Effects of Food, Health, WASH, and Care Adequacies on Child Nutrition in Tunisia, 2011–12 (adequate WASH access definition 3)

Adequacies	Full	Urban	Rural	Poor	Nonpoor	Rural quart1
Adequate in: WASH only	-0.631	-0.985		-1.024	0.430	
	[2.017]	[2.036]		[2.356]	[3.450]	
Adequate in: WASH and Health only	0.763	0.273	3.817	2.039	0.467	3.856*
	[0.566]	[0.602]	[2.468]	[1.707]	[0.616]	[2.245]
Adequate in: WASH and Care and Health only	0.895	0.374	1.687		0.697	
	[1.147]	[1.368]	[2.132]		[1.176]	
Adequate in: WASH and Care and Food and Health only	-1.542	-1.896			-1.740	
	[3.064]	[3.088]			[3.125]	
Adequate in: Food only	1.018*	1.380	0.751	0.251	1.576**	0.361
	[0.595]	[0.871]	[0.812]	[0.867]	[0.792]	[0.838]
Adequate in: Health only	0.405**	0.020	0.835***	0.214	0.313	0.328
	[0.168]	[0.232]	[0.248]	[0.275]	[0.216]	[0.296]
Adequate in: Care only	-0.248	-0.324	-0.033	-0.517	0.063	-0.407
	[0.416]	[0.688]	[0.525]	[0.575]	[0.580]	[0.561]
Adequate in: Care and Food only	0.245	0.580	0.228	0.674	-0.096	0.427
	[0.724]	[1.208]	[0.902]	[0.945]	[1.064]	[1.263]
Adequate in: Care and Health only	-0.193	-0.655*	0.267	-0.149	-0.248	0.006
	[0.241]	[0.350]	[0.331]	[0.368]	[0.311]	[0.385]
Adequate in: Food and Health only	0.201	-0.107	0.485	0.987*	-0.126	0.926
	[0.299]	[0.388]	[0.479]	[0.574]	[0.357]	[0.637]
Adequate in: Care and Food and Health only	0.327	0.323	0.259	0.347	0.217	-0.022
	[0.361]	[0.491]	[0.530]	[0.662]	[0.432]	[0.692]
Constant	-0.318**	0.036	-0.687***	-0.616***	-0.120	-0.726***
	[0.153]	[0.216]	[0.216]	[0.227]	[0.201]	[0.241]
Observations	988	548	440	306	682	254
R-squared	0.018	0.019	0.039	0.025	0.017	0.030

Source: Authors' estimates based on the 2011–12 MICS.

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