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# Welfare Dynamics with Synthetic Panels

The Case of the Arab World in Transition

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## Abstract

This paper studies welfare dynamics, especially changes associated with middle-class status in countries in the Middle East and North Africa, before and after the Arab Spring transitions, using objective and subjective welfare measures. Absent panel data, the analysis employs state-of-the-art synthetic panel techniques using repeated cross sections of expenditure data from household surveys and subjective well-being data from value surveys, which were conducted during the 2000s and the Arab Spring period. The objective welfare dynamics indicate mixed trends. About half the

poor in the 2000s moved out of poverty by the end of the decade, but chronic poverty remained high; upward mobility was strong in Syria and Tunisia, but downward mobility was pronounced in Yemen and Egypt. Subjective well-being dynamics suggest negative developments in most countries during the Arab Spring transitions. Low education achievement, informal worker status, and rural residency are positively associated with lower than average chances for upward mobility, and greater than average chances for downward mobility according to both types of welfare measures.

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# **Welfare Dynamics with Synthetic Panels: The Case of the Arab World in Transition**

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## **I. Introduction**

Analysis of welfare dynamics plays a crucial role in the design of development policies, particularly regarding poverty reduction. Without a clear understanding of the dynamic processes underlying poverty trends, policies can turn out to be inefficient, or even ineffective. For example, assume that two rounds of cross sectional household surveys indicate a slightly decreasing headcount poverty rate. This net fall in poverty certainly indicates progress in the right direction, but does not offer any insights on the nature of poverty mobility. It may be characterized by either a situation of extreme volatility in which nearly all the poor households in the first period escape poverty but are replaced by households that were non-poor in the first period, or a situation of near stagnation in which most households see no change in their welfare. The policies required to deal with these very different situations are also distinctly different. While strong social protection programs would most effectively address transitory poverty (as they help prevent the non-poor but vulnerable households from falling into poverty), chronic poverty may only be ameliorated with longer-term investments in human capital and infrastructure. Thus, analysis of welfare dynamics is an integral part of a well-informed development policy strategy.

We make use of different sources of survey data to advance our knowledge on welfare dynamics for the Middle East and North Africa (MENA) region during the transition period spanning the Arab Spring. Conceptually, our study combines both objective measures (i.e., money-metric indicators of poverty) and subjective measures (i.e., life evaluation using “Cantril Ladder” scores) to investigate welfare dynamics. Subjective welfare measures are a good alternative to and can complement monetary welfare measures since the latter do not reflect many factors affecting well-being such as job satisfaction, the quality of public services (e.g., health, education, transportation, and control of corruption), the environment, and expectations about the future. Relying exclusively on objective data to measure welfare dynamics accurately is difficult, if not

impossible.<sup>1</sup> Using both types of measures therefore is a good way to obtain a more comprehensive picture on welfare dynamics. Furthermore, the few existing studies that combine objective and subjective data focus on static rather than dynamic analyses of welfare outcomes.<sup>2</sup>

For the purpose of exploring the dynamics underlying the changes of the middle class, we not only split the population into poor and non-poor to study movements in and out of poverty, but we also divide the population into three groups: the low-income group that represents the poor; the middle-income group that represents to a large extent the middle class, including those who are vulnerable to falling into poverty; and the top-income group that represents those who are mostly upper-middle class or affluent. In the process, we use two different and novel approaches to define the income groups. These methods yield consistent results and one of them also allows us to estimate more accurately the size of the middle class in developing MENA. Notably, defining the middle class is not a straightforward task and has not been done in a region-wide context for the MENA countries.

On the empirical front, the MENA region presents an interesting case for analysis for a number of reasons. There is a high degree of cross-country heterogeneity in the region in terms of per capita income levels and poverty incidence: poverty rates range from less than 1 percent in the middle-income Palestine territories to more than 50 percent in low-income Republic of Yemen (using the international poverty line of \$2/day). Yet, the region has been undergoing major changes with the Arab Spring events impacting most countries. Against this backdrop, our multi-country

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<sup>1</sup> For example, recent evidence points to significant differences between the perceived income distribution and the actual income distribution in Egypt between 2000 and 2008 (Verme, 2014). See also Ravallion (2012) for an overview of the use of subjective data in measuring poverty, and Dolan, Peasgood and White (2008) and Graham (2010) for recent surveys of studies on happiness; Veehoven (2002) argues that subjective indicators are important for policy makers for a variety of reasons.

<sup>2</sup> A limitation of our study is that all the objective data available to us were collected before the Arab Spring. We thus have to restrict our analysis with objective data to the pre-Arab-Spring period, although we can analyze subjective well-being data spanning the Arab Spring transition.

welfare dynamics analysis is highly relevant and helps shed further light on the processes driving these changes. To our knowledge, this is the first time such analysis is being implemented in the context of the Arab countries.

One major obstacle that hinders the analysis of welfare dynamics in the Arab countries is the ubiquitous absence of panel household survey data. Even when such panel surveys exist, they are often plagued by data quality issues such as attrition bias due to the fact that some households drop out of the sample in follow-up survey rounds. We overcome the lack of actual panel data in the Arab countries by constructing synthetic panels from repeated cross sectional survey rounds using the methods developed in Dang et al. (2014) and Dang and Lanjouw (2013). These synthetic panels allow us to examine the movements among different categories of objective welfare, including the low-income, middle-income, and top-income groups, and subjective welfare, including the groups of the unhappy, struggling, and satisfied, with a particular focus on the Arab Spring countries. Furthermore, since these synthetic panels are constructed from fresher rounds of the repeated cross sections, they are (much) less affected by the issues discussed above.<sup>3</sup>

Our findings highlight the value added of undertaking welfare dynamics analyses with synthetic panels using both objective expenditure data and subjective well-being data from micro survey data.<sup>4</sup> The results suggest strong upward mobility for objective welfare in Tunisia and the Syrian Arab Republic, and downward mobility in the Republic of Yemen and the Arab Republic of Egypt. However, subjective well-being has deteriorated in most countries prior to and after the Arab Spring (2009-2012). The share of dissatisfied people increased while those of the happier

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<sup>3</sup> In addition, the definition of “panel data” may itself vary for different contexts. For example, a panel may be defined based on whether the household head remains the same or whether the residence, where the data are collected, remains the same. Our analysis is not affected by this issue since we construct the synthetic panels for all countries using the same method.

<sup>4</sup> On a macro level, the fact that happiness is observed not to increase as a country's income rises has long been known as the Easterlin paradox (see, e.g., Easterlin et al., 2010).

groups declined in almost all countries, especially the Arab Spring countries (Egypt, Syria, Tunisia, and Yemen). Only in Morocco positive dynamics prevailed after the Arab Spring when the size of the unhappy population declined by more than a quarter. We also find that certain characteristics such as low education achievement, informal work, and rural residence are negatively associated with upward mobility and positively associated with downward mobility according to both objective and subjective welfare measures.

The remainder of this paper is organized in four sections. We provide a brief overview of the framework of analysis in Section II, discuss the data and the regional context in Section III, present the results in Section IV, and offer concluding remarks in Section V.

## **II. Framework of the Analysis**

### **II.1. Overview of the Synthetic Panel Method<sup>5</sup>**

Let  $x_{ij}$  be a vector of household characteristics observed in survey round  $j$  ( $j = 1$  or  $2$ ) that are also observed in the other survey round for household  $i$ ,  $i = 1, \dots, N$ . These household characteristics include variables that may be collected in only one survey round, but whose values can be inferred for the other round. These variables may be roughly categorized into three types i) time-invariant variables such as ethnicity, religion, place of birth, or parental education; ii) deterministic variables such as age (which given the value in one survey round can then be determined given the time interval between the two survey rounds),<sup>6</sup> and iii) time-varying household characteristics if

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<sup>5</sup> We provide an overview of the methods used to construct synthetic panels developed by Dang et al. (2014) and Dang and Lanjouw (2013) in this section. Interested readers are referred to these papers for more details. Recent applications/validations of these methods against actual panel data include Bierbaum and Gassmann (2012) for the Kyrgyz Republic, Ferreira et al. (2013) and Cruces et al. (2015) for Latin American countries, Martinez et al. (2013) for the Philippines, Garbero (2014) for Vietnam, Cancho et al. (2015) for European and Central Asian countries, and Dang and Lanjouw (2015) for India.

<sup>6</sup> To reduce spurious changes due to changes in household composition over time, we restrict the estimation samples to household heads age 25 to 55 in the first cross section and adjust this age range accordingly in the second cross section. This restriction also helps ensure that certain variables such as the household heads' education attainment remains relatively stable over time (assuming these household heads are finished with their schooling). This age range is usually used in traditional pseudo-panel analysis but can vary depending on the cultural and economic factors in

retrospective questions about the values of such characteristics in the first survey round are asked in the second round.

Then let  $y_{ij}$  represent household consumption or income in survey round  $j$ ,  $j = 1$  or  $2$ . The linear projection of household consumption (or income) on household characteristics for each survey round is given by

$$y_{ij} = \beta_j' x_{ij} + \varepsilon_{ij}. \quad (1)$$

If  $z_j$  is the poverty line in period  $j$ , then we are interested in finding out the percentage of households that are poor in the first (or previous) period but non-poor in the second (or current) period

$$P(y_{i1} < z_1 \text{ and } y_{i2} > z_2), \quad (2a)$$

as well as the percentage of poor households in the first period that escape poverty in the second period

$$P(y_{i2} > z_2 \mid y_{i1} < z_1). \quad (2b)$$

For the average household, quantity (2a) provides the joint (unconditional) probabilities of household poverty status in both periods and quantity (2b) the conditional probabilities of household poverty status in the second period given their poverty status in the first period. Put differently, using panel data, quantities (2a) or (2b) provide the gross changes of poverty over time, which adds a dynamic and more nuanced picture to the net change of poverty that can simply be obtained by comparing the headcount poverty rates in two cross sections.

If true panel data are available, we can straightforwardly estimate the quantities in (2a) and (2b); but in the absence of such data, we can use synthetic panels to study mobility. To operationalize the framework, we make two standard assumptions. First, we assume that the

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each specific setting. Headcount poverty rates using this age restriction (Table 3) are very similar to those without the restriction (Table 1.1 in the Appendix). The Gallup Poll Survey collects individual data for people age 15 or older rather than household data, thus we restrict individuals to the age range 15-55 to keep reasonable sample sizes.



underlying population being sampled in survey rounds 1 and 2 are identical such that their time-invariant characteristics remain the same over time. Coupled with equation (1), this assumption implies that the conditional distribution of expenditure in a given period remains unchanged whether it is conditioned on the given household characteristics in period 1 or period 2 (i.e.,  $x_{i1} = x_{i2}$  implies  $y_{i1}|x_{i1}$  and  $y_{i1}|x_{i2}$  have identical distributions). Second, we assume that  $\varepsilon_{i1}$  and  $\varepsilon_{i2}$  have a bivariate normal distribution with positive correlation coefficient  $\rho$  and standard deviations  $\sigma_{\varepsilon_1}$  and  $\sigma_{\varepsilon_2}$ , respectively. Quantity (2a) can then be estimated by

$$P(y_{i1} < z_1 \text{ and } y_{i2} > z_2) = \Phi_2\left(\frac{z_1 - \beta_1' x_{i2}}{\sigma_{\varepsilon_1}}, -\frac{z_2 - \beta_2' x_{i2}}{\sigma_{\varepsilon_2}}, -\rho\right), \quad (3)$$

where  $\Phi_2(\cdot)$  stands for the bivariate normal cumulative distribution function (cdf). In equality (3), the parameters  $\beta_j$  and  $\sigma_{\varepsilon_j}$  are estimated from equation (1), and  $\rho$  can be estimated using an approximation of cohort-aggregated household consumption between the two surveys. For prediction purposes, the estimated parameters obtained from data in both survey rounds are applied to data from the second survey round ( $x_2$ ) (or the base year), but we can use data from the first survey round as well. It is then straightforward to estimate quantity (2b) by dividing quantity (2a)

by  $\Phi\left(\frac{z_1 - \beta_1' x_{i2}}{\sigma_{\varepsilon_1}}\right)$ , where  $\Phi(\cdot)$  stands for the univariate normal cumulative distribution function (cdf).<sup>7</sup>

## II.2. Welfare Thresholds and Dynamics

Two recent papers discuss various ideas that can help define the middle class in the context of the MENA countries. The first one is by Abu-Ismael and Sarangi (2013), who apply different

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<sup>7</sup> Further asymptotic results and formulae for the standard errors are provided in Dang and Lanjouw (2013).

definitions of the middle class—as suggested by Birdsall (2007), Ravallion (2010), Chun (2010), and Ferreira et al. (2013)—to household data for Egypt and the MENA region as a whole. They show that the different definitions lead to dramatically different middle-class sizes in low-income and middle-income regions. For example, the estimated size of the MENA middle class is either implausibly small, representing under 5 percent of the population with the definitions proposed by Birdsall (2007) and Ferreira et al. (2013), or implausibly large, accounting for more than three-quarters of the population with the definitions in Chun (2010) and Ravallion (2010). The other paper by Ali (2011) uses the national poverty line converted to PPP dollars and \$13 per day as the lower bound and the upper bound for the middle class, respectively, but also appears to overestimate the size of the middle class as vulnerable households with consumption levels just above the poverty line are considered part of the middle class.

Several limitations exist, however, with respect to the definitions that rely on fixed thresholds. Absolute thresholds will have to differ across countries and time in order to be useful for making inferences about the size of the middle class. The MENA region is comprised of low-income, low-middle-income, high-middle-income, and high-income economies, and the heterogeneous income distributions of these economies may not even overlap. Furthermore, fixed thresholds cannot capture the differential price effects within countries and other important welfare effects that are incorporated in the estimation of national poverty lines. An alternative is to define income groups by asking people if they considered themselves to be poor, middle class, or rich and cross check the outcomes with those obtained using objective definitions based either on absolute or relative threshold measures (Ferreira et al., 2013).

We follow two approaches in setting the welfare thresholds (lines) that define the different income groups (i.e., the low-income, middle-income, and top-income groups). Our first approach builds on the literature discussed above, but adopts a hybrid combination of both the absolute and

relative definitions. In particular, we build on World Bank’s definition of shared prosperity (as growth in mean consumption for the bottom 40 percent of the income distribution; see, e.g., Basu, 2013; Jolliffe et al., 2015) and define the two lower income groups respectively as the bottom 40 percent and the middle 40 percent. The remaining 20 percent of the income distribution thus forms the top 20 percent or the affluent.<sup>8</sup> But given our focus on dynamics analysis, after dividing the income distribution into three groups in the first period, we then keep these income thresholds fixed for the second period.<sup>9</sup>

The second approach follows Dang and Lanjouw (forthcoming) and employs the existing (national or international) poverty line to define the category of the poor. It then further disaggregates the non-poor group into two subcategories: one group is the vulnerable, who are defined as those currently non-poor but facing a significant risk of falling into poverty in the next period (i.e., these are mostly people who belong to the low-middle-income group), and the remaining group of people who belong to the upper-middle class and the affluent. This approach derives the vulnerability line from a specified vulnerability index  $\mathcal{P}$ , defined as the percentage of the non-poor population in the first period that fall into poverty in the second period.<sup>10</sup>

These two approaches are complementary along several dimensions. The first approach applies a fixed and static threshold to the income distribution, while the second approach takes into account

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<sup>8</sup> In a slight abuse of notation, we use the pairs of terms “income” and “consumption”, and “(un)happiness” and “(dis)satisfaction” interchangeably in this paper. A similar note applies for the terms “top 20 percent”, and “affluent”. We also refer to the poor or the bottom 40 percent as the lowest income group, the middle 40 percent as the middle income group, and the top 20 percent as the top income group. The term ‘pro-unhappy’ in the discussion of subjective welfare is equivalent to the term ‘pro-poor’ in the discussion of monetary welfare.

<sup>9</sup> Put differently, the World Bank’s standard definition is most relevant for anonymous growth analysis, where the consumption level for the bottom 40 percent in each period is tracked. Our focus is on non-anonymous growth analysis, where we track welfare of the same households (individual) over time.

<sup>10</sup> In particular, given a specified vulnerability index  $\mathcal{P}$ , the vulnerability line  $V_l$  can be empirically obtained from this equality  $\mathcal{P} = P(y_2 \leq Z_2 | Z_1 < y_1 < V_l)$ . In other words, the vulnerability line is the highest income level among the currently nonpoor who have a specified probability of falling into poverty in the next period. See Dang and Lanjouw (forthcoming) for more details.

the dynamics of income change over time in adjusting the vulnerability line. Depending on income levels and the poverty line, the bottom 40 percent of the income distribution can accommodate a variety of poverty scenarios, ranging from consisting of all the poor to very little of the poor (we empirically illustrate this later). Thus by explicitly focusing on the population below the poverty line rather than on the bottom 40 percent, the second approach can better track the change in the size of the poor group. Put differently, the second approach can perhaps be considered more pro-poor than the first approach. Finally, since the income distribution varies by country, the fixed thresholds under the first approach are country-specific, which can then be supplemented with region-wide vulnerability lines that can be derived under the second approach.<sup>11</sup>

Regardless of which approach is employed, given two income thresholds ( $z_j$  and  $v_j$ ), we can extend expression (2a) to analyze the mobility across welfare categories. For example, the percentage of poor households in the first period that escape poverty but still remain vulnerable in the second period (joint probability) is

$$P(y_{i1} < z_1 \text{ and } z_2 < y_{i2} < v_2) = \Phi_2\left(\frac{z_1 - \beta_1'x_{i2}}{\sigma_{\varepsilon_1}}, \frac{v_2 - \beta_2'x_{i2}}{\sigma_{\varepsilon_2}}, \rho\right) - \Phi_2\left(\frac{z_1 - \beta_1'x_{i2}}{\sigma_{\varepsilon_1}}, \frac{z_2 - \beta_2'x_{i2}}{\sigma_{\varepsilon_2}}, \rho\right) \quad (4)$$

More generally, expression (4) also represents the percentage of the population in the lowest income group in the first period that move to the middle-income group in the second period.

### III. Data, Setting Welfare Thresholds, and Regional Context

#### III.1. Data

In this paper we analyze household surveys for six Arab economies, including Egypt, Jordan, Palestine territories, Syria, Tunisia, and Yemen. These surveys have been harmonized for

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<sup>11</sup> We could consider the bottom 40 percent of the region-wide income distribution, but this may not add much value to country-level analysis since income levels substantially differ across countries in the MENA region.

comparability both across countries and within countries over time using methodologies developed by the World Bank, the Luxembourg Income Study, OECD, and country statistical offices, as described in greater detail in Hassine (2015). All expenditure data used in this analysis have been deflated by the CPI of the respective economy and year, and adjustments for spatial price differences have been made for Egypt, Syria, and the Palestine territories.<sup>12</sup> The PPP conversion factor for private consumption (LCU per international dollar), obtained from the World Development Indicators database (World Bank, 2015), is employed to facilitate comparison of consumption expenditure levels across countries. Only in the case of the Palestine territories, the PPP conversion factor for GDP is used instead.

The household surveys cover different years for different countries. The surveys for Egypt, Jordan, the Palestine territories, and Tunisia have been conducted in the mid-to-late 2000s, but in the cases of Syria and Yemen they were implemented in the late 1990s to the mid-2000s. Appendix Table 1.1 shows details on each country, including the names of the surveys, the survey years, and the headcount poverty rates for the first and last years in the survey period.

In order to assess welfare dynamics with alternative, subjective welfare measures, we employ data on subjective well-being from the Gallup World Poll. The annual Gallup World Poll contains nationally representative country samples of at least 1,000 randomly selected respondents who are 15 and older. Since most of the variables (including education achievement) that are employed in the construction of the synthetic panels are only collected in the Gallup Poll in 2009 or after, we focus on the whole period 2009-2012 to obtain a longer term perspective and include all Arab countries for which we have subjective well-being information. But we also offer stylized graphical analysis of life satisfaction for several countries for the period immediately preceding

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<sup>12</sup> The absence of spatial price differentials prevented adjustments for regional price differentials in Jordan, Tunisia, and Yemen.

the Arab Spring (2007-2010) and the period after the Arab Spring (2010-2012). For the regional analysis, we construct the synthetic panel using data from 16 countries, including the Arab Spring countries (Egypt, Libya, Syria, Tunisia, and Yemen) and other countries (Algeria, Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Qatar, Saudi Arabia, and United Arab Emirates), but for the country-level analysis we focus on only nine countries with larger sample sizes (i.e., Algeria, Egypt, Iraq, Jordan, Lebanon, Morocco, Syria, Tunisia, and Yemen).<sup>13</sup>

Life satisfaction in the Gallup Poll was measured using a question known as the “Cantril Ladder” or “Self-Anchoring Striving Scale” (Cantril, 1965). The question is stated as follows:

*“Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?”*

The higher the given score is, the closer the respondent’s life is to his or her “ideal” life.<sup>14</sup>

### **III.2. Setting Welfare Thresholds**

Table 1 displays the country-specific thresholds for the bottom 40 percent and the middle 40 percent for both objective measures and subjective measures, based on our first definition of the welfare categories. As discussed above, these thresholds are obtained from the data in the first survey period and are then kept fixed in the second period for the welfare dynamics analysis. This table illustrates our earlier discussion that the bottom 40 percent represent the poor and the vulnerable in a country but to different extents across countries. For example, the bottom 40 percent in Egypt includes all the poor and some of the vulnerable to poverty as the cutoff line for

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<sup>13</sup> We do not make comparisons of monetary and subjective well-being indicators at the regional level due to the different time intervals and country compositions in the two databases.

<sup>14</sup> The Gallup Poll also collects data on self-reported income. But since this variable is much less meticulously constructed compared to household consumption data in the household surveys, we do not construct synthetic panel data for income. We come back to this issue in the next section.

the 40th percentile is PPP\$2.5/day (column 3), which is slightly above the national absolute poverty line.<sup>15</sup> By contrast, in the case of Syria, the threshold for the bottom 40 percent is very close to the national absolute poverty line, implying that the low-income group includes primarily the absolutely poor.

The thresholds based on our second definition of the welfare categories are simpler and set for the whole region. They are PPP\$2/day and PPP\$4.9/day for the poverty and the vulnerability lines, respectively. The latter corresponds to a vulnerability index of 20 percent, which is comparable to vulnerability analyses done for other countries, including India, the United States, and Vietnam (Dang and Lanjouw, 2015 and forthcoming; Rama et al., 2015).<sup>16</sup> This definition implies that the low-income group represents the poor, the middle-income group captures the vulnerable (and perhaps some of the lower middle class), and the top-income group depicts mostly the (upper) middle class and the affluent in Arab countries. Our estimates of the population shares for each income group in the 1<sup>st</sup> period (Table 2) defined with the second approach show that the size of the middle class substantially varies across Arab countries, but hovers around 36 percent of the regional population.<sup>17</sup> The middle class is smallest in Egypt and Syria, where it accounts for close to 10% of the population, and is largest in the Palestine territories and Tunisia, where the majority of the population is middle-class. Thus, unlike the existing literature, the second approach allows us to define a more plausible size for the middle class in the region and to come up with specific estimates of the middle class by country.

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<sup>15</sup> Abu-Ismaïl and Sarangi (2013) estimate the lower poverty line, also known as the food poverty line, at 2005 PPP\$2.3 a day in 2011, and construct an upper poverty line that includes expenditure on food and essential non-food items.

<sup>16</sup> A range of vulnerability lines that correspond to other vulnerability indexes are provided in Table 1.3 in Appendix 1.

<sup>17</sup> The regional averages are simple (unweighted) averages. The middle class increases to slightly more than 40 percent of the regional population in the second period (Table 1.5).

Since the subjective welfare measure is a discrete variable (with 10 values only), we thus use the first definition of the welfare categories and search for the cutoff points below which the shares of the population are closest to 40 percent or 80 percent. For example, the threshold for the lowest welfare category is 5 for Algeria (Table 1, column 5), where 49 percent of the population are at or below this score (Table 1, column 6). But the corresponding threshold for Lebanon is 4, with 29 percent of the population falling below this score (Table 1).<sup>18</sup> For the region-wide analysis (e.g., Table 6), we similarly define three distinct satisfaction groups based on the regional averages: the unhappy (or dissatisfied/suffering) with life evaluation scores of 4 and below, the struggling with life evaluation scores between 5 and 6, and the happy (or satisfied) with well-being scores of 7 or above.

### **III.3. Regional Context**

Extreme poverty defined at the \$1.25 a day (in 2005 PPP\$) is not an issue in the MENA region. For example, the regional extreme poverty rate dropped below 2 percent between 2005 and 2011. The extreme poverty line of \$1.25 thus cannot capture accurately the poverty situation in most middle-income Arab economies where average per capita incomes are relatively high. Furthermore, raising this poverty line to \$2 a day dramatically increases the poverty rates in many of these countries, especially for Egypt, Yemen, Iraq, and Morocco (Figure 1), which indicates that in many Arab countries a large share of the poor is clustered just above the \$1.25 poverty line. Abu-Ismaïl and Sarangi (2013) also show that the equivalent of \$1.25 in current Egyptian currency is much below the value of the national extreme poverty line (or the absolute poverty line, also known as the food poverty line), estimated at \$2.3/day (in 2005 PPP\$) in 2011. This value is close

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<sup>18</sup> Raising the score to 5 would increase the population below this score to 56 percent, which is farther from the 40 percent mark.



to Syria's national absolute poverty line, estimated at \$2.2/day in 2003-04 (El-Laithy and Abu-Ismail, 2005).

Given the objective of presenting cross-country comparisons, we fix the poverty line at \$2 a day (in 2005 PPP\$) for all the countries in our sample. This line is close to the national absolute poverty thresholds for Syria and Egypt, although it is above the national absolute poverty lines in Yemen and below the national poverty lines in Tunisia, Jordan, and the Palestine territories. Therefore, it overestimates poverty in Yemen but underestimates poverty in Tunisia, Jordan, and Palestine (Figure 1).

Table 3 indicates some progress with poverty reduction in the 2000s. Poverty rates declined in Tunisia, Syria, Jordan and the Palestine territories and increased in Egypt and Yemen. The subjective well-being data, however, reveals a different picture from the household survey data. It shows a uniformly bleak situation in the period before the Arab Spring (Figure 2, top panels), although we do not make strict comparisons of the quantitative changes observed in each country because of the differences in the survey years captured with the objective and subjective data.<sup>19</sup> In all developing MENA countries on which we have sufficient information, the percentage of dissatisfied (unhappy) people – those with life evaluation scores below the lower cutoff point of 4 or 5 as discussed in Table 1 – was high and increased between 2007 and 2010. The deterioration was particularly large in the Arab Spring countries, especially Egypt and Syria. By the end of the decade almost half of the population in Syria and Egypt were unhappy about their life (Figure 2, top panels). Importantly, unhappiness rates in Arab Spring countries were mostly higher than those in other countries in the region (Figure 2, top panels).

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<sup>19</sup> Data are not available for all countries in 2007. Thus we use data in 2006 for Lebanon, and 2008 for Algeria, Iraq, Syria, and Tunisia. We also show estimates for nine countries with larger sample sizes only. Estimates using a larger sample consisting of other countries provide a qualitatively similar result.

These results suggest that welfare dynamics analysis based on monetary measures may not always align with welfare dynamics analysis based on subjective measures of welfare. In particular, before the Arab Spring, Egypt and Yemen experienced both increasing poverty (Table 3, column 8) and rising unhappiness (Figure 2). However, in Syria and Tunisia falling poverty was registered at a time of rising unhappiness. Our findings are consistent with the mixed evidence in the literature on the linkage between poverty and happiness. Poverty and unhappiness are found to not necessarily overlap in India (Banerjee and Duflo, 2007), Mexico (Rojas, 2008), Peru and Russia (Graham and Pettinato, 2002), and various other countries (Graham, 2010).<sup>20</sup>

Furthermore, average subjective well-being levels in nearly all developing Arab countries kept on deteriorating after 2010 and the deterioration in the Arab Spring countries was much larger than that in the rest of the Arab countries in our sample (Figure 2, bottom panels). Unsurprisingly, the post-Arab Spring decline has been most pronounced in Syria where the civil war took many lives, displaced millions of families, and resulted in massive destruction. The share of unhappy people in Syria nearly doubled, reaching 75 percent of the population, compared to just 45 percent in 2010 (Figure 2, bottom panels). In all other Arab developing countries, the deterioration has been moderate to mild. Only in Morocco, average subjective well-being levels improved and the share of unhappy people declined markedly (Figure 2, bottom panels).

Overall, the period between (around) 2007 and 2012 was a tumultuous one as dissatisfaction rates skyrocketed in many Arab countries. The rate of suffering was highest in Syria, followed by Yemen, Egypt, and Tunisia. Morocco was the only country where the situation improved substantially after 2010. Qualitatively similar patterns hold for the period 2009-2012 for

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<sup>20</sup> However, poverty can have negative effects in the longer term. For example, Friedman and Thomas (2009) find that the 1997-98 economic crisis in Indonesia may have more persistent and harmful effects on the psychological well-being of the Indonesian population than on standard measures of economic well-being.

the Arab Spring countries. The next section explores the subjective well-being dynamics using synthetic panel data.

## IV. Estimation of Welfare Dynamics

### IV.1. Welfare Dynamics for Monetary Measures

To gain further insight into the nature of poverty mobility, we decompose the poverty rate in the second period into the chronic poverty rate and the downward mobility rate as follows

$$P(y_{i2} \leq Z_2) = P(y_{i1} \leq Z_1 \text{ and } y_{i2} \leq Z_2) + P(y_{i1} > Z_1 \text{ and } y_{i2} \leq Z_2) \quad (5)$$

The first and second terms on the right-hand side of the expression represent the rate of chronic poverty and downward mobility, respectively. If the poverty rate stays constant between the first and second periods, expression (5) implies an inverse relationship between chronic poverty and downward mobility. Table 3 presents the decomposition of the headcount poverty rate in the second period (column 4) into the chronic poverty rate (i.e., the incidence of those who remain poor in both periods; column 5) and the rate of the downwardly mobile (i.e., those who were nonpoor in the first period but became poor in the second period; column 6).<sup>21</sup> Similarly, the poverty rate in the first period (column 3) can also be decomposed into two components, the chronic poverty rate (column 5) and the rate of upwardly mobile (i.e., those who were poor in the first period but who became nonpoor in the current period; column 7). For comparison, the net change in poverty (column 8) is obtained by simply subtracting the poverty rate in the first period from that in the second period.<sup>22</sup>

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<sup>21</sup> Chronic poverty rates are estimated with the standard errors shown in Table 1.2 in Appendix 1. This table also provides the underlying regressions for the household consumption models (equation 1) and other parameters. For example, the partial correlation coefficient  $\rho$  is estimated based on these parameters and some combination of age cohorts (i.e., age cohorts for Egypt, Jordan, and the Palestine territories, age cohorts interacted with gender for Syria and Tunisia, and age cohorts interacted with education for Yemen).

<sup>22</sup> Table 3 (column 3) illustrates our earlier discussion that the bottom 40 percent can comprise a wide variety of poverty situations, ranging from all the households being poor (Syria) to around half being poor (Egypt) to very few of them being poor (Palestine) at the \$2/ day poverty line.

The six countries as a whole performed reasonably well in terms of poverty mobility. Slightly more than half (53 percent) of the poor in the first period moved out of poverty in the second period (i.e., divide column 7 by column 3), but chronic poverty was also high at around 50 percent (i.e., divide column 5 by column 4). Yemen, Egypt, and Syria were the three countries with highest poverty incidence in the region, but unlike Syria the other two countries became poorer in the 2000s (column 8). Although poverty reduced in Syria,<sup>23</sup> its share of chronically poor people (87 percent) was much higher than that in Yemen (51 percent) and Egypt (46 percent). In contrast to Syria, Yemen and Egypt had low shares of upwardly mobile people. The upward mobility rates in the remaining countries were fairly high at around 80 percent or more.

Next we turn to the welfare dynamics of the three income groups: the low-income group, the middle-income group, and the top-income group for richer analysis. These three groups correspond to the bottom 40 percent, the middle 40 percent, and the top 20 percent under the first definition of the welfare categories, and the poor, the vulnerable, and the middle class under the second definition of the welfare categories. In both cases, the welfare dynamics analysis allows us to understand trends in shared prosperity rather than simply progress with poverty reduction.

Estimation results, shown respectively in Table 4 and Table 5 for the two definitions, are broadly consistent with the poverty mobility trends discussed in Table 3. In particular, in Yemen and Egypt average consumption growth is negative, with the low-income group expanding and the middle and top-income groups contracting. Yet, in the remaining countries, a more nuanced picture of welfare dynamics emerges. Under the first definition, in Syria as the bottom two income groups contract, the top-income group expands (Table 4, columns 3 through 5), but under the second definition, only the low-income group shrinks as people move to middle-income and top-income

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<sup>23</sup> Note that the time length between the 1<sup>st</sup> and 2<sup>nd</sup> periods varies by countries as shown in Appendix Table 1.1. It is longest for Yemen and Syria (6 to 7 years) and shortest for Jordan (2 years); in all other cases the time period spans 3 to 4 years.

status (table 5, columns 3 through 5). In the cases of Tunisia and the Palestine territories,<sup>24</sup> the reverse happens. Under the first definition, the low-income and middle-income categories for the region as a whole (last row of Table 4) shrink less than they do under the second definition (last row of Table 5), because the second definition focuses on and strongly rewards growth for the low-income groups.

Other than ranking countries based on the cumulative annual growth in mean consumption (satisfaction), an alternative ranking method is to apply the typology of pro-poor growth provided in Dang and Lanjouw (2016), which prioritizes the low-income group and the middle-income group (in that order) before the top-income group. Appendix 2 provides a detailed discussion of this method and its ranking, which provides rather similar results. Another option, still, is to consider growth in the mean consumption for the different welfare groups instead of the changes in the population share (Table 1.4 in Appendix 1).

The results in Tables 4 and 5 focus on the increase or decrease of the population size of each welfare groups, but do not consider between-group movements. We probe more deeply into such transitions and show the results in Figure 3. It displays the share in total population of the upwardly mobile (i.e., those who moved from the low-income to the middle and top-income groups, or from the middle-income to the top-income group), the immobile (i.e., those whose incomes remained in the same income categories), and the downwardly mobile (i.e., those who moved down one or two income categories). Downward mobility (maroon bars) and upward mobility (orange bars) are unsurprisingly lower and higher respectively for most countries under the 2<sup>nd</sup> than the 1<sup>st</sup> definition of welfare groups (Figure 3, right panel) as the 2<sup>nd</sup> definition is more pro-poor as discussed earlier. These estimation results provide a consistent picture on welfare dynamics. They identify Syria,

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<sup>24</sup> Note that the results for the Palestine territories should be interpreted with caution as much of the expenditure growth is driven by foreign aid rather than by sustainable economic activity.

Tunisia, and the Palestine territories as countries with stronger upward than downward mobility and Yemen and Egypt as countries with stronger downward than upward mobility, and Jordan as a country with relatively balanced upward and downward mobility. For the region as a whole, the middle class also expands by more than 15 percent in this period (from 36 percent (Table 2) to 42 percent (Table 1.5)).

#### **IV.2. Welfare Dynamics for Subjective Well-being Measures**

We now turn to analyzing subjective well-being dynamics. Table 6 presents the transition dynamics for the three income categories in the Arab Spring countries and the rest of the countries in the region. During the period shortly between 2009 and 2012 period, more people joined the ranks of the unhappy and exited the ranks of the struggling and happy (categories) in both Arab Spring countries and other MENA countries. However, this deteriorating trend was stronger in the Arab Spring countries than elsewhere in the Arab world. While the unhappy category for other Arab countries in the region increased by 26 percent (i.e.,  $= 1 - (42.1/33.5)$ ), in the Arab Spring countries it increased by 31 percent. At the same time, the decrease in the size of the categories of struggling and satisfied people in Arab Spring countries was more than twice and four times the decline of these categories in other Arab countries. In terms of absolute numbers, the unhappy category in the Arab-Spring- group of countries expanded by 15 percentage points and increased from around half of the population in 2009 to close to 65 percent of the population in 2012. In other Arab countries, this group expanded by just 8.5 percentage points and increased from 34 percent of the population in 2009 to 42 percent of the population in 2012.

Another useful way to gauge the subjective welfare dynamics is to look at the percentage of the population that changed their welfare status during this period. In the Arab Spring countries, 18 percent of the population moved up one or two subjective welfare categories (i.e., the sum of

the upper off-diagonal cells), but the percentage of people who moved down one or two welfare categories (i.e., the sum of the lower off-diagonal cells) was twice as large at 34 percent. The corresponding figures for the other countries in the region were smaller at 15 percent and 25 percent, respectively. The region-wide trend is qualitatively similar, with 15 percent of the population moving up one or two subjective welfare categories and 28 percent moving down one or two subjective welfare categories during the period 2009-12 (see Table 1.6, Appendix 1).

We provide country-level satisfaction dynamics by country in Figure 4. As in Figure 3 showing the dynamics for monetary measures, Figure 4 defines the (upwardly) downwardly mobile as those who move (up) down one or two income categories, and the immobile or those who remain in the same income category. The figure illustrates that in the context of subjective well-being, there was less upward mobility and more downward mobility in the Arab Spring countries—Syria, Yemen, Egypt, and Tunisia—than in other Arab countries.

The growth patterns for the different satisfaction categories shown in Table 7 provides a similar story. The Arab Spring countries rank in the bottom half in terms of their growth in mean subjective well-being and all nine Arab countries in our sample except Morocco appear to have experienced decline in mean subjective well-being. Another ranking of the transitions based on the pro-unhappy typology in Dang and Lanjouw (2016) also indicates that the four Arab Spring countries rank lowest (Table 2.4, Appendix 2).

### **IV.3. Profiling of Population Groups**

What are the welfare dynamics patterns at a more disaggregated level? Using both definitions of objective welfare groups, we plot in Figure 5 the percentage of the poor or vulnerable in the first year who move up one or two welfare categories in the second year for major population groups classified by gender, education levels (i.e., less than primary (or no) education, primary

education, secondary education, post-secondary education, and college), occupation (i.e., paid employee, employer, self-employed, and others—informal work—including unpaid family workers and other categories), and residence areas (i.e., rural or urban).<sup>25</sup>

A couple of remarks are in order for Figure 5. First, having no education achievement, being employed as informal worker, and living in rural residence are all characteristics that are positively associated with lower-than-average chances for upward mobility during the pre-Arab Spring period (i.e., the orange dots represent the transition percentages lying below the dashed line that represents the national average in panel A). These are also the same characteristics that are associated with having higher-than-average chances of downward mobility (panel B); while the opposite holds for the remaining characteristics.<sup>26</sup> Second, the two definitions of the welfare groups offer qualitatively similar results for the different population groups. This is consistent with the findings we have at the country level, where upward mobility is generally higher than downward mobility.

The variables in the Gallup Poll surveys are defined somewhat differently from those in the harmonized household survey data and we add another variable indicating whether an individual is a migrant (from another country) or a native resident. Figure 6 then plots the same type of graphs for the subjective well-being dynamics of. The results are qualitatively similar but perhaps more muted than those for the monetary measures in Figure 5. In this case too downward mobility is stronger than upward mobility but there is somewhat more variation by population group in the

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<sup>25</sup> We show the conditional, rather than the joint, probabilities in Figures 5, 6, and 7 since this helps us bring out more clearly the transition patterns for the different population groups. For example, a small percentage of the population with secondary or higher education are usually found in poverty or vulnerability in the first period to start with, consequently their transitions to higher income categories are smaller. An additional assumption required for producing these graphs is that the mobility for each population group should generally follow that for the whole population.

<sup>26</sup> Factors that are positively correlated with upward mobility are in general related to those associated with escaping downward mobility, but this may not always hold. See, e.g., Dang and Lanjouw (2015) for an analysis of mobility in India.



case of downward mobility than upward mobility. For example, moving from primary education to secondary education is associated with roughly a 5 percentage point increase in upward mobility but a 7 percentage point decrease in downward mobility for both the Arab Spring countries and the other countries. Figure 6 also shows that while migrants are more likely to be less upwardly mobile (and more downwardly mobile) in Arab Spring countries, the opposite holds for non-Arab-Spring countries.

We draw non-parametric curves of the subjective well-being dynamics against individual income (in logarithmic form from the Gallup Poll surveys) in Figure 7. Notably, upward mobility remains rather flat for both the Arab Spring countries and other countries along the income distribution, but downward mobility shows a decreasing trend toward higher income levels. Downward mobility also slightly curves upward at the top income levels, suggesting that the most affluent experienced erosion in happiness levels to an extent similar in magnitude to those of the lower income groups.<sup>27</sup>

## **V. Concluding Remarks**

We provide systematic analysis of welfare dynamics in the Arab countries using both objective measures and subjective measures of well-being. The advantage of the latter is that they capture factors important to subjective well-being such as quality of life, expectations, and changes not yet reflected or not measured well with objective data. The use of alternative welfare measures is essential as the period of interest forms a watershed moment in the history of the Arab region, so objective measures may not reflect adequately the changes affecting people's perceptions. Although the Gallup World Poll offers the most complete survey data on subjective well-being, the fact that these data were not available in most cases for the period before 2009 prevented us

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<sup>27</sup> Formal t-tests, however, indicate that the differences between the affluent and the poor are statistically significant.

from undertaking detailed subjective welfare dynamics by country before the Arab Spring and limited our ability to compare systematically the welfare dynamics with subjective and objective indicators. Furthermore, cross-country comparisons based on objective welfare dynamics metrics should also be interpreted with caution because the available household survey data were collected during different but overlapping time periods.

Several lessons emerge from this work. First, analysis of welfare dynamics using household surveys' expenditure data do not always align with that based on subjective well-being data, as is the case in Yemen and Egypt during the pre-Arab Spring period. The results are qualitatively different for Syria and Tunisia where downward mobility is stronger than upward mobility, according to subjective well-being data, but the reverse was the case according to monetary welfare indicators. Thus, our study, can provide a potentially useful framework of analysis for future work in different country contexts, including in terms of defining the middle class.

Second, welfare dynamics based on expenditure measures indicate mixed trends. Slightly more than half of the poor in the first half of the 2000s were able to move out of poverty by the end of the decade. However, chronic poverty was also high, accounting for around 50 percent of total poverty in the region. Upward mobility was particularly strong in Tunisia and Syria, but downward mobility was most pronounced in Yemen and Egypt. Although the poverty rate in Syria declined dramatically, chronic poverty was still alarmingly high at the end of the 2000s.

Third, the subjective welfare dynamics suggest negative developments in most countries during the Arab Spring transitions. The share of dissatisfied people increased while those of the happier groups declined in almost all countries. This trends is particularly pronounced in the Arab Spring countries. Only Morocco shows positive dynamics with the size of the unhappy population declining by more than a quarter.

Finally, certain characteristics, such as having low education achievement, working as an informal worker, and living in a rural area, are positively associated with lower-than-average chances of upward mobility and higher-than-average chances of downward mobility for objective welfare. Qualitatively similar but somewhat muted results hold for subjective welfare. Furthermore, the poor appear to be at high risk for downward mobility.

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**Table 1: Thresholds for the 1<sup>st</sup> Definition of Welfare Categories, Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No	Country	Monetary measures (\$/day)		Life satisfaction			
		40th percentile	80th percentile	40th percentile		80th percentile	
				Sat. score	Population (%)	Sat. score	Population (%)
1	Algeria	N/A	N/A	5	48.8	7	86.9
2	Egypt	2.5	4.3	4	29.2	6	80.9
3	Iraq	N/A	N/A	4	41.8	6	85.1
4	Jordan	4.3	7.6	5	35.9	7	81.7
5	Lebanon	N/A	N/A	4	28.8	6	71.3
6	Morocco	N/A	N/A	4	45.0	6	88.2
7	Palestine	6.5	13.6	N/A	N/A	N/A	N/A
8	Syria	2.0	3.6	4	37.9	6	77.1
9	Tunisia	4.2	9.1	4	23.9	6	80.7
10	Yemen	2.3	4.5	4	42.0	6	79.1
	<b>Average</b>	3.6	7.1	4.2	37.0	6.2	81.2

**Note:** Authors' calculations are based on household survey data for columns 3 and 4, and Gallup Poll survey data for columns 5 to 8. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round for columns 3 and 4; respondents' age is between 15 and 55 in the first survey round and adjusted accordingly for the second survey round for columns 5 to 8. The thresholds that identify the different welfare categories are obtained from data in the first period, and are kept unchanged for the second period. "N/A" indicates that data are unavailable.

**Table 2: Population Share by Welfare Category, Using 2nd Definition for Welfare Categories (percentage)**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Population share of each welfare category in 1st period			
		Poor	Vulnerable	Middle Class	Total
1	Palestine	1.4	23.0	75.5	100
2	Jordan	4.3	46.2	49.5	100
3	Tunisia	9.4	39.9	50.7	100
4	Egypt	20.2	65.5	14.3	100
5	Yemen	32.3	50.7	17.0	100
6	Syria	40.5	50.6	8.9	100
	<b>Average</b>	18.0	46.0	36.0	100

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The poverty line and vulnerability line are set at \$2/day and \$4.9/day respectively. The vulnerability line corresponds to a vulnerability index of 20 percent. Countries are ranked first in a decreasing order of poverty and then vulnerability.



**Table 3: Net and Gross Changes in Poverty over Time by Country (percentage), Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No	Country	Headcount poverty in 1st period	Headcount poverty in 2nd period			Upward mobile	Net change
			Total	Decomposition			
				Chronic poverty	Downward mobile		
1	Palestine	1.4	0.7	0.1	0.6	1.3	-0.7
2	Jordan	4.3	2.4	1.0	1.4	3.3	-1.9
3	Tunisia	9.4	4.9	1.2	3.7	8.2	-4.5
4	Syria	40.5	8.4	7.3	1.1	33.2	-32.1
5	Egypt	20.2	29.2	13.3	15.9	6.9	9.0
6	Yemen	32.3	55.8	28.3	27.5	4.0	23.4
	Average	18.0	16.9	8.5	8.3	9.5	-1.1

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The poverty line is set at \$2/ day in 2005 PPP dollars for both periods. Estimates for chronic poverty are based on the synthetic panels. Countries are ranked in an increasing order of poverty in the 2nd period. Columns 5 and 6 add up to column 4, and columns 5 and 7 add up to column 3. Column 8 is obtained by subtracting column 4 from column 3.

**Table 4: Change in the Size of the Objective Well-being Categories by Country Using 1<sup>st</sup> Definition (percentage), Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Growth in the population share of each welfare category			Annual growth in mean consumption
		Bottom 40%	Middle 40%	Top 20%	
1	Syria	-79.8	-21.2	202.0	10.1
2	Tunisia	-32.2	14.4	35.6	2.9
3	Palestine	-11.0	9.0	4.0	1.2
4	Jordan	-0.7	2.2	-3.0	-0.8
5	Egypt	28.0	-13.7	-28.5	-2.7
6	Yemen	58.5	-31.9	-53.2	-3.7
	<b>Average</b>	-6.2	-6.9	26.2	1.2

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The 40th and 80th percentile of the income distribution in the first period are used as the thresholds that respectively identify the Bottom 40 percent and the Middle 40 percent for both periods. Countries are ranked in a decreasing order of the cumulative annual growth rate of mean consumption (column 6).

**Table 5: Change in the Size of the Objective Well-being Categories by Country Using 2<sup>nd</sup> Definition (percentage), Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Growth in the population share of each welfare category			Annual growth in mean consumption
		Poor	Vulnerable	Middle Class	
1	Syria	-79.4	3.1	343.2	10.1
2	Tunisia	-48.0	-21.7	26.0	2.9
3	Palestine	-48.4	-17.0	6.1	1.2
4	Jordan	-44.7	1.6	2.4	-0.8
5	Egypt	44.6	-7.0	-31.1	-2.7
6	Yemen	72.6	-28.7	-52.5	-3.7
	<b>Average</b>	-17.2	-11.6	49.0	1.2

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The poverty line and vulnerability line are set at \$2/day and \$4.9/day respectively. The vulnerability line corresponds to a vulnerability index of 20 percent. Countries are ranked in a decreasing order of the cumulative annual growth rate of mean consumption (column 6).

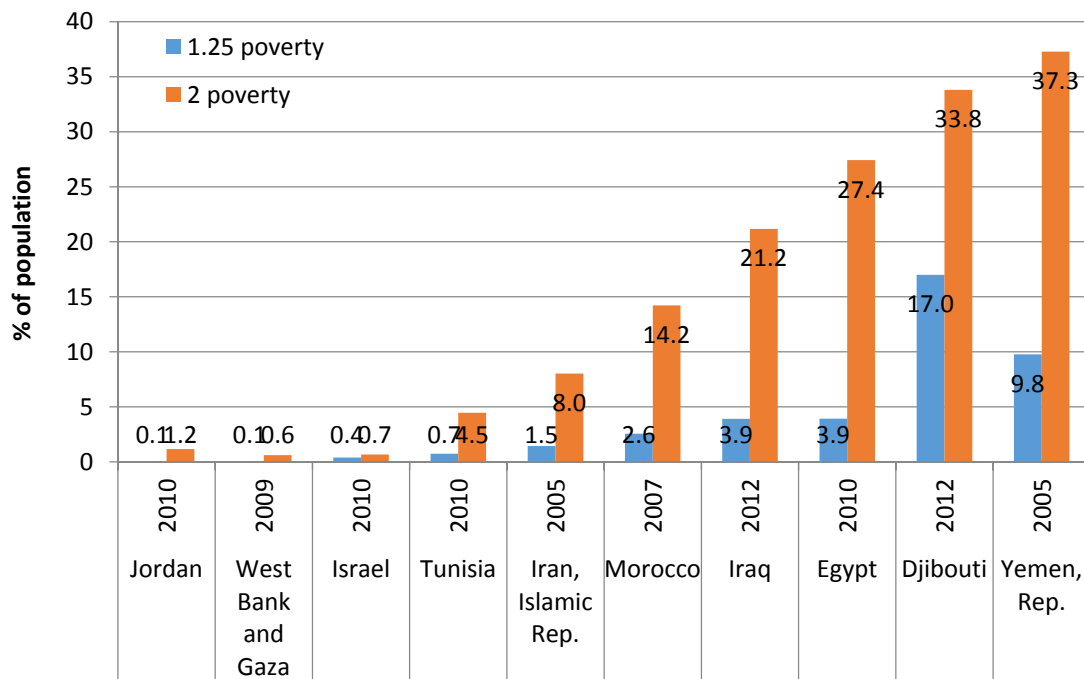
**Table 6: Subjective Well-being Transition Dynamics with Synthetic Panels, 2009- 2012 (percentage)**

<b>Panel A: Arab Spring countries</b>		<b>2012</b>			
		<b>Unhappy</b>	<b>Struggling</b>	<b>Happy</b>	<b>Total</b>
<b>2009</b>	<b>Unhappy</b>	35.4	9.9	3.1	48.4
		(0.1)	(0.0)	(0.0)	(0.1)
	<b>Struggling</b>	20.6	9.9	4.5	35.0
		(0.0)	(0.0)	(0.0)	(0.0)
	<b>Happy</b>	7.5	5.5	3.6	16.5
		(0.0)	(0.0)	(0.0)	(0.0)
	<b>Total</b>	63.5	25.4	11.2	100
		(0.1)	(0.0)	(0.0)	
<b>Panel B: Other regional countries</b>		<b>2012</b>			
		<b>Unhappy</b>	<b>Struggling</b>	<b>Happy</b>	<b>Total</b>
<b>2009</b>	<b>Unhappy</b>	24.6	8.6	0.4	33.5
		(0.1)	(0.0)	(0.0)	(0.1)
	<b>Struggling</b>	16.7	29.5	6.0	52.2
		(0.0)	(0.0)	(0.0)	(0.0)
	<b>Happy</b>	0.8	7.0	6.5	14.3
		(0.0)	(0.0)	(0.0)	(0.0)
	<b>Total</b>	42.1	45.0	12.9	100
		(0.1)	(0.0)	(0.0)	
<p>Note: Authors' calculation are based on Gallup Poll survey data. All numbers are estimated with synthetic panel data and weighted with population weights, where the second survey round is used as the base year. Bootstrap standard errors in parentheses are estimated with 1,000 bootstraps.</p> <p>Respondents' age is between 15 and 55 in the first survey round and adjusted accordingly for the second survey round. The satisfaction thresholds that identify the Happy and Struggling groups are 5 and 7, which respectively correspond to the 40th and 80th percentile for the whole region. Estimation sample sizes in panel A are 9,192 individual for Arab Spring countries (Egypt, Libya, Syria, Tunisia, and Yemen) and in panel B are 17,652 individuals from the other regional countries (Algeria, Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Qatar, Saudi Arabia, and United Arab Emirates).</p>					

**Table 7: Change in the Size of the Subjective Well-being Categories by Country, 2009-2012 (percentage)**

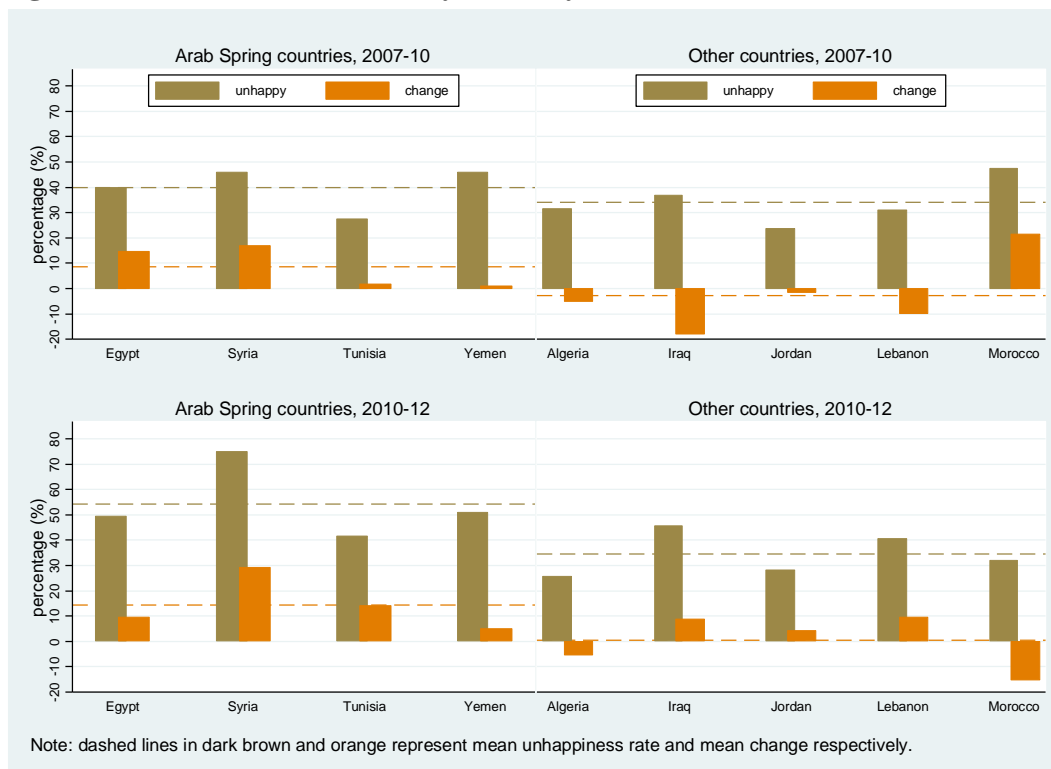
(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Growth in the population share of each welfare category			Annual growth in mean satisfaction
		Unhappy	Struggling	Happy	
1	Morocco	-26.7	16.4	0.0	1.3
2	Algeria	1.7	-14.1	0.0	-0.1
3	Iraq	6.0	-12.6	0.0	-0.3
4	Lebanon	39.5	-4.4	-0.1	-4.4
5	Tunisia	74.3	-20.4	-0.1	-5.2
6	Jordan	62.0	-30.1	-0.1	-5.5
7	Yemen	22.3	0.2	-0.1	-6.0
8	Egypt	71.1	-23.2	-0.1	-6.4
9	Syria	100.3	-68.7	-0.1	-14.4
	<b>Average</b>	38.9	-17.4	0.0	-4.6
<p><b>Note:</b> Authors' calculation are based on Gallup Poll survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Respondents' age is between 15 and 55 in the first survey round and adjusted accordingly for the second survey round. The satisfaction thresholds that identify the Happy and Struggling groups are provided in Table 1. Countries are ranked in a decreasing order of the cumulative annual growth rate of mean satisfaction (column 6).</p>					

**Figure 1: Poverty Rates by Country**

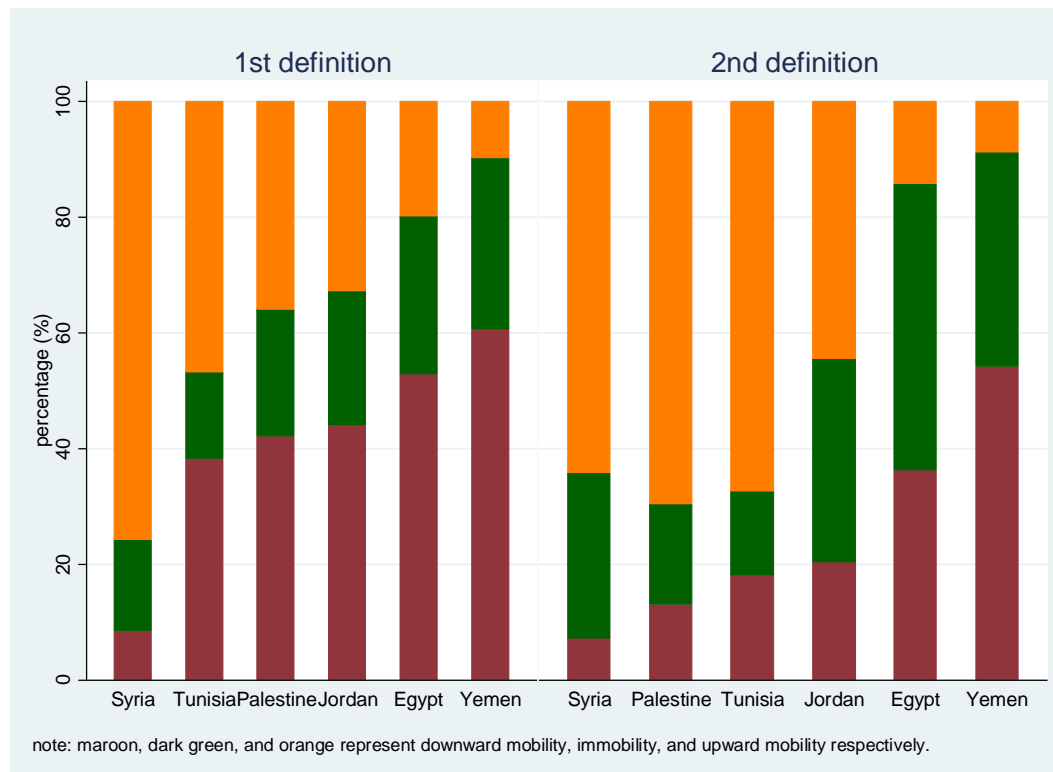


Source: Vishwanath, Atamanov and Krishnan (2015).

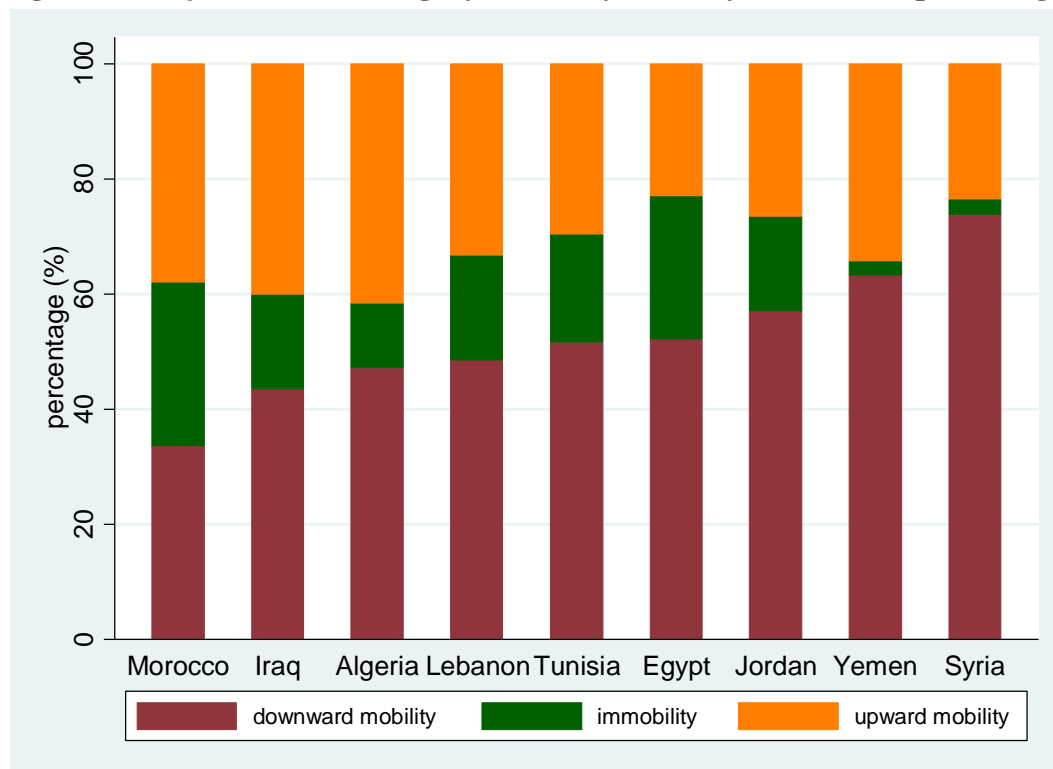
**Figure 2: Dissatisfaction Rates by Country, 2007-2012**



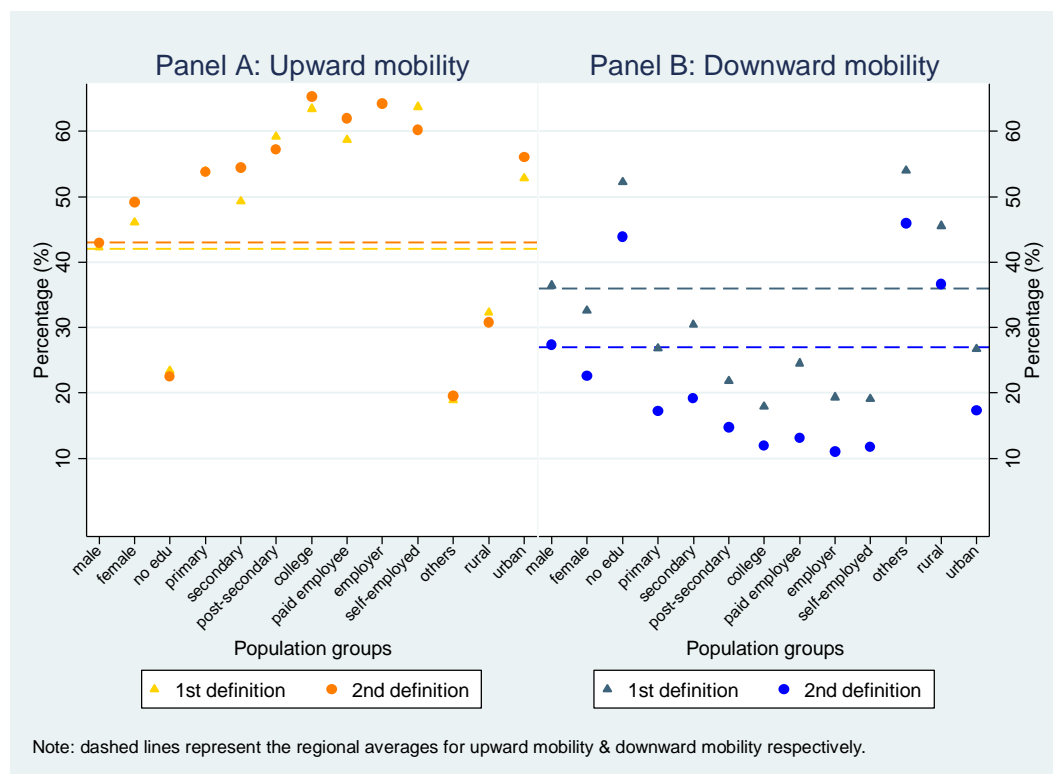
**Figure 3: Welfare Dynamics Using Monetary Measures by Country, Pre-2010**



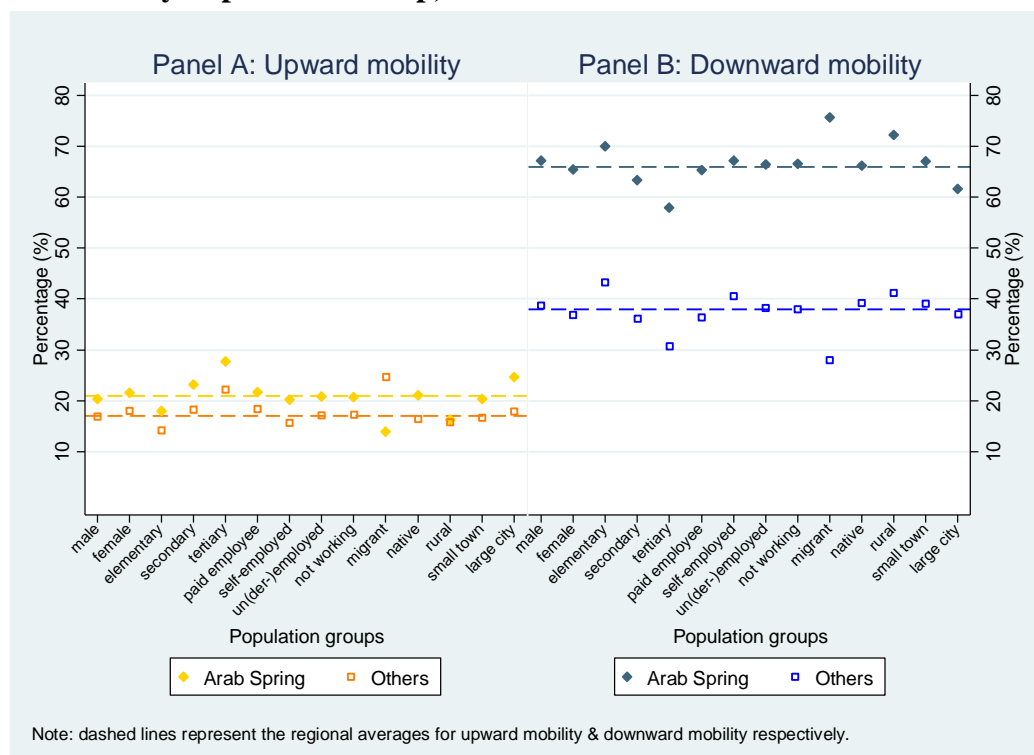
**Figure 4: Subjective Well-being Dynamics by Country, 2009-2012 (percentage)**



**Figure 5: Region-wide Welfare Dynamics Using Monetary Measures by Population Group, Pre-2010**

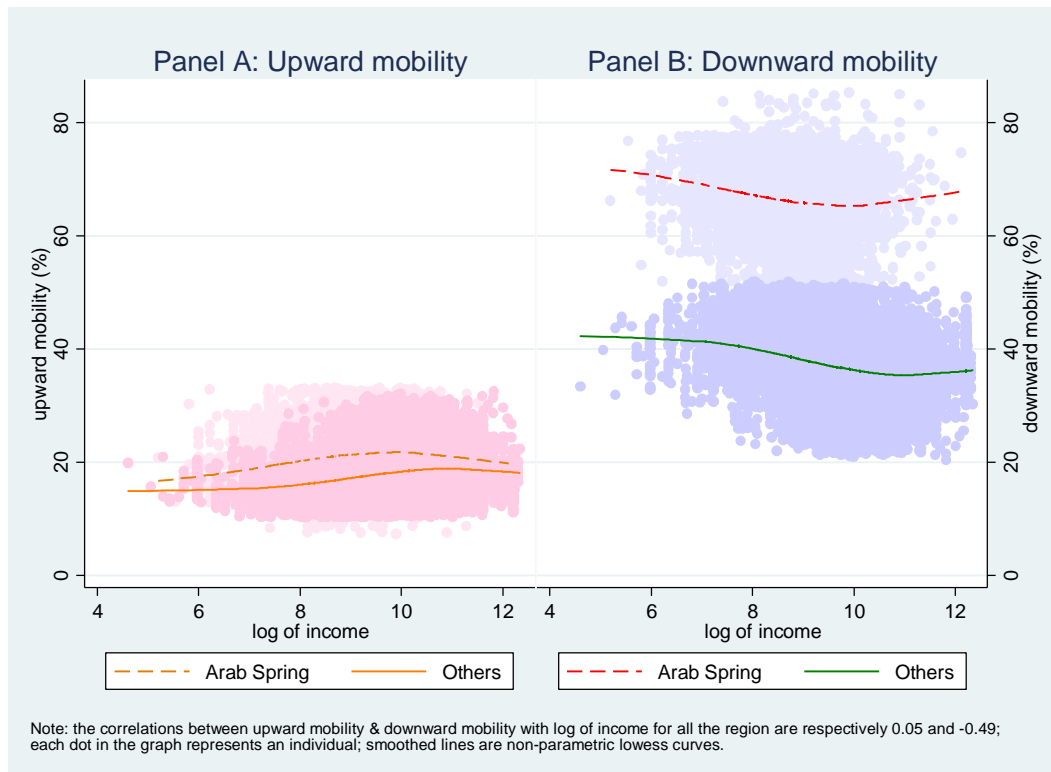


**Figure 6: Subjective Well-being Dynamics in Arab Spring Countries and Other Arab Countries by Population Group, 2007-2012**





**Figure 7: Subjective Well-being Dynamics vs. Income for Arab Spring Countries and Other Arab Countries, 2007-2012**



## Appendix 1: Additional Tables and Figures

**Table 1.1: Survey Years, Headcount Poverty and Dissatisfaction for Each Country**

(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: Objective being</b>					
No	Country	Survey name	Survey years	Headcount poverty (percent)	
				1st period	2nd period
1	Egypt	Household Income, Expenditure and Consumption survey (HIEC)	2004-2009	19.0	28.6
2	Jordan	Household Expenditure and Income survey (HEIS)	2006-2008	3.8	2.2
3	Palestine	Palestine Expenditure and Consumption survey (PECS)	2005-2009	1.5	0.7
4	Syria	Household Budget survey (HBS)	1997-2004	38.8	7.5
5	Tunisia	Household Budget Consumption and Living Standards survey (HBCLS)	2005-2010	8.0	4.6
6	Yemen	Household Budget survey (HBS)	1998-2006	31.7	54.5
<b>Regional average</b>				<b>17.1</b>	<b>16.4</b>
<b>Panel B: Subjective being</b>					
No	Country	Survey name	Survey years	Dissatisfaction (percent)	
				1st period	2nd period
1	Algeria	Gallup World Poll	2009-2012	23.2	25.8
2	Egypt	Gallup World Poll	2009-2012	30.2	49.4
3	Iraq	Gallup World Poll	2009-2012	41.7	45.7
4	Jordan	Gallup World Poll	2009-2012	16.1	28.1
5	Lebanon	Gallup World Poll	2009-2012	29.3	40.6
6	Morocco	Gallup World Poll	2009-2012	45.7	32.0
7	Syria	Gallup World Poll	2009-2012	37.9	75.0
8	Tunisia	Gallup World Poll	2009-2012	25.6	41.6
9	Yemen	Gallup World Poll	2009-2012	42.8	51.0
<b>Regional average</b>				<b>32.5</b>	<b>43.2</b>
<b>Note:</b> Authors' calculation based on household survey data. The poverty line is set at \$2/ day in 2005 PPP dollars, and the dissatisfaction threshold is set at a value of 4 (out of a scale of 10) for both periods. Objective data are updated based on Hassine (2015).					

**Table 1.2: Household Consumption Models, Pre-2010**

	Country											
	Egypt		Jordan		Palestine		Syria		Tunisia		Yemen	
	2004	2009	2006	2008	2005	2009	1997	2004	2005	2010	1998	2006
Head is female	0.171*** (0.012)	0.162*** (0.011)	0.271*** (0.052)	0.264*** (0.047)	0.118 (0.091)	0.229*** (0.053)	0.143*** (0.016)	0.255*** (0.017)	0.274*** (0.025)	0.177*** (0.024)	-0.093*** (0.028)	0.122*** (0.030)
Head's age	0.004*** (0.000)	0.008*** (0.000)	0.007*** (0.002)	0.006*** (0.001)	0.001 (0.002)	0.011*** (0.001)	-0.002*** (0.001)	0.007*** (0.000)	0.006*** (0.001)	0.010*** (0.001)	-0.005*** (0.001)	0.007*** (0.001)
Head completes primary school	0.137*** (0.012)	0.161*** (0.011)	0.157*** (0.047)	0.158*** (0.044)	0.138*** (0.053)	0.183*** (0.040)	0.094*** (0.009)	0.134*** (0.011)	0.239*** (0.022)	0.217*** (0.020)	0.009 (0.033)	0.221*** (0.024)
Head completes secondary school	0.218*** (0.009)	0.324*** (0.029)	0.286*** (0.041)	0.316*** (0.039)	0.276*** (0.050)	0.298*** (0.037)	0.159*** (0.011)	0.317*** (0.013)	0.586*** (0.024)	0.550*** (0.022)	0.156*** (0.022)	0.272*** (0.022)
Head completes post-secondary school	0.314*** (0.017)	0.259*** (0.008)	0.379*** (0.050)	0.441*** (0.050)	0.461*** (0.069)	0.510*** (0.052)	0.218*** (0.018)	0.329*** (0.018)	0.479*** (0.057)	0.924*** (0.048)	0.181*** (0.053)	0.289*** (0.050)
Head completes college	0.601*** (0.011)	0.594*** (0.011)	0.793*** (0.051)	0.797*** (0.046)	0.636*** (0.064)	0.678*** (0.045)	0.422*** (0.017)	0.586*** (0.016)	1.244*** (0.032)	1.125*** (0.031)	0.510*** (0.035)	0.638*** (0.032)
Urban	0.307*** (0.007)	0.278*** (0.007)	0.132*** (0.031)	0.166*** (0.029)	0.169*** (0.031)	0.038 (0.025)	0.093*** (0.008)	0.231*** (0.008)	0.434*** (0.015)	0.408*** (0.015)	0.419*** (0.015)	0.470*** (0.015)
Constant	6.536*** (0.019)	6.187*** (0.020)	6.814*** (0.085)	6.786*** (0.077)	7.566*** (0.097)	7.223*** (0.074)	6.671*** (0.023)	6.732*** (0.026)	6.541*** (0.051)	6.593*** (0.046)	6.983*** (0.034)	6.016*** (0.043)
σ	0.431	0.431	0.519	0.477	0.543	0.561	0.591	0.557	0.628	0.599	0.627	0.617
Adjusted R2	0.299	0.282	0.155	0.210	0.086	0.108	0.050	0.135	0.339	0.343	0.126	0.192
ρ	0.50		0.41		0.33		0.48		0.10		0.68	
N	16945	17066	1962	1904	1662	2891	20985	21187	7440	7566	10282	8623
Estimates for chronic poverty using synthetic panels	13.3		1.0		0.1		7.3		1.2		28.3	
	(0.08)		(0.03)		(0.00)		(0.03)		(0.03)		(0.14)	
<b>Note:</b> *p<0.1, **p<0.05, ***p<0.01. Standard errors are in parentheses. Household heads' ages are restricted to between 25 and 55 for the first survey round and adjusted accordingly for the second survey round.												

**Table 1.3: Vulnerability Lines at Given Vulnerability Indexes, Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)
No	Vulnerability index (%)	Vulnerability line (2005 PPP)	Increase (%)	Pop. share with consumption above poverty line but less than V-line in first period (%)	N
1	35	2.8	40	14.4	40350
2	33	2.9	45	16.3	39197
3	32	3.00	50	18.3	38092
4	30	3.1	55	20.1	37018
5	29	3.2	60	21.9	36001
6	28	3.3	65	23.6	34992
7	27	3.5	75	26.9	33013
8	26	3.6	80	28.5	32092
9	25	3.7	85	30.0	31182
10	24	3.9	95	32.9	29437
11	23	4.1	105	35.6	27845
12	22	4.3	115	38.0	26328
13	21	4.6	130	41.4	24206
14	20	4.9	145	44.4	22391
15	19	5.3	165	47.9	20150
16	18	5.7	185	51.0	18259
17	17	6.3	215	54.7	15692
18	16	7.2	260	59.0	12811
19	15	8.4	320	62.8	9668
20	14	11.2	460	67.6	5575

**Note:** Vulnerability lines are estimated for the region as a whole. Relative increases of the vulnerability line from the poverty line is shown under the column "Increase" (column 4). All numbers are estimated with synthetic panel data and weighted with population weights. Household head's age range is restricted to between 25 and 55 for the first survey and adjusted accordingly for the second survey in each period. The incremental value for iteration is 10 cents/ day in 2005 PPP dollar.

**Table 1.4: Growth in Consumption for Welfare Categories by Country Using 1<sup>st</sup> Definition (percentage), Pre-2010**

(1)	(2)	(3)	(4)	(5)
No	Country	Growth in mean consumption for each welfare category		
		Bottom 40%	Middle 40%	Top 20%
1	Syria	14.9	5.7	31.5
2	Tunisia	5.1	2.4	-5.4
3	Palestine	3.8	-0.3	2.2
4	Jordan	2.0	-0.7	-2.8
5	Egypt	-4.0	-1.6	-1.5
6	Yemen	-10.3	-3.8	17.3
	<b>Average</b>	1.9	0.3	6.9

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The 40th and 80th percentile of the income distribution in the first period are used as the thresholds that respectively identify the Bottom 40 percent and the Middle 40 percent for both periods. Countries are ranked in a decreasing order of the cumulative annual growth rate of mean consumption (column 6).

**Table 1.5: Population Share of Each Welfare Category, Using 2nd Definition (percentage)**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Population share of each welfare category in most recent period			
		Poor	Vulnerable	Middle Class	Total
1	Palestine	0.7	19.1	80.1	100
2	Tunisia	4.9	31.3	63.8	100
3	Jordan	2.4	46.9	50.7	100
4	Syria	8.4	52.2	39.4	100
5	Egypt	29.2	61.0	9.8	100
6	Yemen	55.8	36.2	8.0	100
	<b>Average</b>	16.9	41.1	42.0	100

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The poverty line and vulnerability line are set at \$2/day and \$4.9/day respectively. The vulnerability line corresponds to a vulnerability index of 20 percent. Countries are ranked first in a decreasing order of poverty and then vulnerability.

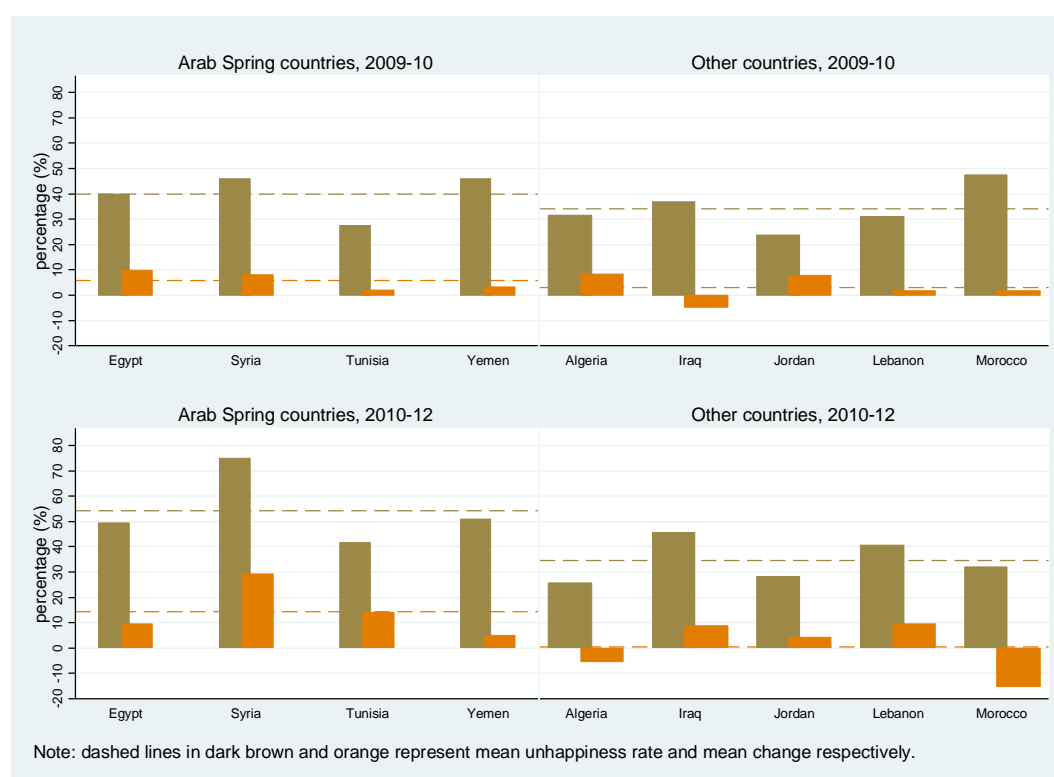
**Table 1.6: Region-wide Well-being Transition Dynamics with Synthetic Panels, 2009- 2012 (percentage)**

		2012			
		Unhappy	Struggling	Happy	Total
2009	Unhappy	29.9	7.2	1.3	38.4
		(0.1)	(0.0)	(0.0)	(0.1)
	Struggling	16.0	14.6	6.5	37.1
		(0.0)	(0.0)	(0.0)	(0.0)
	Happy	3.6	8.8	12.2	24.5
		(0.0)	(0.0)	(0.0)	(0.0)
Total		49.5	30.5	20.0	100
		(0.1)	(0.0)	(0.1)	

**Note:** Authors' calculation are based on Gallup Poll survey data. All numbers are estimated with synthetic panel data and weighted with population weights, where the second survey round is used as the base year. Bootstrap standard errors in parentheses are estimated with 1,000 bootstraps.

Respondents' age is between 15 and 55 in the first survey round and adjusted accordingly for the second survey round. The satisfaction thresholds that identify the Happy and Struggling groups are provided in Table 2. Estimation sample sizes are 26,844 individuals from 16 countries.

**Figure 1.1: Dissatisfaction Rate by Country, 2009-2012**



## Appendix 2: An Alternative Method of Ranking the Transition Dynamics

After classifying the population into welfare categories, we rank the growth in the population sizes of each group over time using an alternative method. We can employ a simple typology of pro-poor growth scenarios for the welfare groups provided in Dang and Lanjouw (2016) to obtain a ranking of the different growth scenarios in terms of pro-poor outcomes. For example, for the case of the three welfare categories, there are in total six possible growth scenarios depending on whether (the population share for) each of the three categories is expanding or shrinking.<sup>28</sup> The first three scenarios relate to the reduction of the lowest income category, while the remaining three scenarios concern the expansion of this category. Thus, by our pro-poor definition, these first three scenarios indicate positive pro-poor growth, and the remaining scenarios suggest negative pro-poor growth. The growth of the middle income category helps determine further the rate of pro-poor growth, for example, whether pro-poor growth is more positive or simply positive.

Table 2.1 shows this typology. Under the most positive pro-poor growth scenario both the low-income and middle-income categories are reduced while the top income category expands (Scenario 1). This is also the best general economic growth scenario, as everyone—regardless of their welfare category—is on average better off. Under the worst pro-poor growth scenario both the low-income and middle-income categories expand while the top income category shrinks and everyone on average is worse off (Scenario 6), which is the opposite of what happens under Scenario 1. All the remaining scenarios can be similarly classified based on the changes in the sizes of these three categories.

Some remarks are in order for this simple typology. First, consistent with a pro-poor criterion, pro-poor growth is considered strongest when the two lower income groups are reduced. Second, the ranking provided in Table 2.1 provides a strong focus on the low-income groups, rather than the mean of the distribution. From this perspective, a growth scenario where the whole economy may grow on average but poor households become poorer is less desirable than another where the economy can slightly contract but poor households are better off.

Finally, the typology provided in Table 2.1 is general enough to be employed with different (absolute or relative) definitions of welfare categories, as well as different welfare outcomes including objective measures and subjective measures. As discussed in Dang and Lanjouw (2016), the cutoff points delineating the different income groups can also be obtained using a variety of approaches, such as employing a range of fixed percentiles of the income distribution (say, between the 40<sup>th</sup> and 80<sup>th</sup> percentiles as in Alesina and Perotti, 1996) or some absolute cutoff thresholds such as between \$2 and \$10 PPP dollars (Banerjee and Duflo, 2008).

Tables 2.2 and 2.3 provide the growth scenarios for the two definitions of welfare categories of consumption, and Table 2.4 provide the growth scenarios for life satisfaction. Estimation results are broadly similar to those shown in the corresponding tables for objective well-being.

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<sup>28</sup> Since these three groups add up to 100 percent, two other scenarios of either expanding or shrinking for all these groups as shares of the population are out of the question. In other words, the increases and decreases in the population shares of the three groups should cancel out each other in the total.



**Table 2.1: Typology of Welfare Transition Dynamics over Two Periods**

Scenario	Pro-poor Growth	Welfare Category			Notes
		1st group	2nd group	3rd group	
		Lowest income	Middle income	Top income	
1	Strongest/ Most positive	-	-	+	first and second group reduce, and third group expands
2	More positive	-	+	+	first group reduces, and second and third group expand
3	Positive	-	+	-	first and third group reduce, and second group expands
4	Negative	+	-	+	first and third group expand, and second group reduces
5	More negative	+	-	-	first group expands, and second and third group reduce
6	Weakest/ Most negative	+	+	-	first and second group expand, and third group reduces
<b>Note:</b> The signs (-) and (+) respectively stand for decrease and increase. Pro-poor growth is defined as the dynamics that are most beneficial to the different categories in this order: Lowest Income, Middle Income, and Top Income. This typology is modified based on Dang and Lanjouw (2016).					

**Table 2.2: Change in the Size of the Objective Well-being Category by Country Using 1st Definition (percentage), Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Growth in the population share of each welfare category			Pro-poor growth scenario
		Bottom 40%	Middle 40%	Top 20%	
1	Syria	-79.8	-21.2	202.0	most positive
2	Tunisia	-32.2	14.4	35.6	more positive
3	Palestine	-11.0	9.0	4.0	more positive
4	Jordan	-0.7	2.2	-3.0	positive
5	Egypt	28.0	-13.7	-28.5	more negative
6	Yemen	58.5	-31.9	-53.2	more negative
	<b>Average</b>	-6.2	-6.9	26.2	most positive

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The 40th and 80th percentile of the income distribution in the first period are used as the thresholds that respectively identify the Bottom 40 percent and the Middle 40 percent for both periods. Pro-poor growth scenarios are based on the classification provided in Table 2.1. Countries are ranked first in a decreasing order of pro-poor growth scenario, and then in an increasing order of growth in the population share of the Bottom 40 percent and Middle 40 percent.

**Table 2.3: Change in the Size of the Objective Well-being Category by Country Using 2nd Definition (percentage), Pre-2010**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Growth in the population share of each welfare category			Pro-poor growth scenario
		Poor	Vulnerable	Middle Class	
1	Palestine	-48.4	-17.0	6.1	most positive
2	Tunisia	-48.0	-21.7	26.0	most positive
3	Syria	-79.4	3.1	343.2	more positive
4	Jordan	-44.7	1.6	2.4	more positive
5	Egypt	44.6	-7.0	-31.1	more negative
6	Yemen	72.6	-28.7	-52.5	more negative
	<b>Average</b>	-17.2	-11.6	49.0	most positive

**Note:** Authors' calculations are based on household survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Household heads' age is between 25 and 55 in the first survey round and adjusted accordingly for the second survey round. The poverty line and vulnerability line are set at \$2/day and \$4.9/day respectively. The vulnerability line corresponds to a vulnerability index of 20 percent. Pro-poor growth scenarios are based on the classification provided in Table 2.1. Countries are first in a decreasing order of pro-poor growth scenario, and then in an increasing order of growth in the population share of the Poor and the Vulnerable.

**Table 2.4: Change in the Size of the Subjective Well-being Category by Country (percentage), 2009-2012**

(1)	(2)	(3)	(4)	(5)	(6)
No	Country	Growth in the population share of each welfare			Pro-unhappy growth scenario
		Unhappy	Struggling	Happy	
1	Morocco	-26.7	16.4	0.0	more positive
2	Algeria	1.7	-14.1	0.0	negative
3	Iraq	6.0	-12.6	0.0	negative
4	Lebanon	39.5	-4.4	-0.1	more negative
5	Jordan	62.0	-30.1	-0.1	more negative
6	Egypt	71.1	-23.2	-0.1	more negative
7	Tunisia	74.3	-20.4	-0.1	more negative
8	Syria	100.3	-68.7	-0.1	more negative
9	Yemen	22.3	0.2	-0.1	most negative
	<b>Average</b>	38.9	-17.4	0.0	more negative

**Note:** Authors' calculation are based on Gallup Poll survey data. All estimates are obtained using population weights, except that the regional average is a simple average (unweighted). Respondents' age is between 15 and 55 in the first survey round and adjusted accordingly for the second survey round. The satisfaction thresholds that identify the Happy and Struggling groups are provided in Table 1. Pro-unhappy growth scenarios are based on the classification provided in Table 2.1. Countries are ranked first in a decreasing order of pro-unhappy growth scenario, and then in an increasing order of growth in the population share of the Unhappy (or bottom 40 percent) and the Struggling (or middle 40 percent).