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A Trap At The Escape From The Trap? Demographic-Structural Factors of Political Instability in Modern Africa and West Asia

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Author:
Korotayev, Andrey, Russian State University for the Humanities, Moscow
Zinkina, Julia, Russian Academy of Sciences Presidium's Program "Complex System Analysis and Mathematical Modeling of the World Dynamics"
Kobzeva, Svetlana, Russian Academy of Civil Service
Bozhevolnov, Justislav, Moscow State University
Khaltourina, Daria, Center for Civilizational and Regional Studies, Russian Academy of Sciences, Moscow
Malkov, Artemy, Russian Academy of Sciences Presidium's Program "Complex System Analysis and Mathematical Modeling of the World Dynamics"
Malkov, Sergey, Institute of Economics, Russian Academy of Sciences

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Abstract:
The escape from the "Malthusian trap" is shown to tend to generate in a rather systematic way quite serious political upheavals. Some demographic structural mechanisms that generate such upheavals have been analyzed, which has made it possible to develop a mathematical model of the respective processes. The forecast of political instability in African and West Asian countries in 2012–2050 produced on the basis of this model is presented.

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A Trap At The Escape From The Trap?
Demographic-Structural Factors of Political Instability in Modern Africa and West Asia

Andrey Korotayev, Julia Zinkina, Svetlana Kobzeva, Justislav Bozhevolnov, Daria Khaltourina, Artemy Malkov, Sergey Malkov
Russian Academy of Sciences

The escape from the 'Malthusian trap' can generate serious political upheavals. We analyze the demographic-structural mechanisms that generate such upheavals and develop a mathematical model of the respective processes. The model yields a forecast of political instability in African and West Asian countries for 2012–2050.

Introduction

The 'Malthusian trap' is often used to describe the dynamics of pre-industrial societies in which economic growth does not lead to an improvement of living conditions, because populations tend to grow faster than economic output. This ensures that the majority of population would remain close to the bare survival level (Malthus 1978 [1798]; Artzrouni and Komlos 1985; Steinmann and Komlos 1988; Komlos and Artzrouni 1990; Steinmannet al. 1998; Wood 1998; Kögel and Prskawetz 2001; Grinin et al. 2008, 2009).

In complex pre-industrial societies the Malthusian trap was one of the main causes of state breakdown. Malthus himself considered warfare (including internal warfare) as one of the most important consequences of overpopulation (in addition to epidemics and famines). The Malthusian dynamic is an important component in recent demographic-structural models describing how population growth leads to sociopolitical instability (for example, Usher 1989; Chu and Lee 1994; Komlos and Nefedov 2002; Turchin 2003, 2005*a*, 2005*b*; Nefedov 2004; Turchin and Nefedov 2009; Turchin and Korotayev 2006; Korotayev and Khaltourina 2006; Korotayev et al. 2006*b*). The question that we address in this article is whether Malthusian traps have any relevance to understanding waves of political instability today.

The sociopolitical upheavals of the 2011 Arab Spring not only were totally unexpected by both the external observers and the populations of respective countries, they also appear not to have any Malthusian antecedents. Indeed, on the verge of these events the economic conditions in the respective countries

Corresponding author's e-mail: akorotayev@gmail.com

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were in no way catastrophic. For example, the levels of poverty and inequality were relatively low by the Third World standards (see, Korotayev and Zinkina 2011a, 2011b). Furthermore, the quality of life for the majority of the population, as measured by such demographic indices as life expectancy, has been steadily improving over the last several decades. Thus, life expectancy at birth in such Arab countries as Egypt, Libya, and Syria (which were all shaken by popular uprisings in 2011) increased from 45–50 years in 1960 to 65–70 years in 1995 and then to 70–75 years by 2010.

This observation, that a wave of sociopolitical destabilization can occur against such relatively benign demographic background, appears to contradict the Malthusian logic. In this article, nevertheless, we shall show that Malthus continues to be relevant today, although in a somewhat unexpected way. We will argue that the wave of sociopolitical destabilization during the Arab Spring was a result of the Arab countries' escape from the Malthusian trap. Although this escape by definition implies the improvement of the standards of life for the majority of the population, it also tends to generate serious sociopolitical upheavals.

Two Examples of the Classical Malthusian Trap in Action: Qing China and Modern Ethiopia

In 1700–1850 China managed to achieve a highly impressive rate of economic growth, in large part due to the introduction of New World crops, such as maize and sweet potatoes and the development of new varieties of previously known cultivated plants, and to agricultural labor intensification and land reclamation (Ho 1955; 1959: 173–189; Lee 1982; Bray 1984: 452, 601; Perkins 1969: 39–40; Fairbank 1992: 169; Lavely and Wong 1998: 725–726; Lee and Wang 1999: 37–40; Mote 1999: 750, 942; Myers and Wang 2002: 599, 634–636; Rowe 2002: 479; Zelin 2002: 216–218). As a result of these innovations the carrying capacity of land during this 'secular cycle' (Turchin and Nefedov 2009) was raised to a radically new level, which made possible significant growth of the Chinese GDP. Thus, according to Maddison's (2001, 2010) estimations, between 1700 and 1850 the GDP of China grew almost threefold. However, the Chinese population grew during the same period of time more than fourfold. As a result, by 1850 we observe a considerable decline of per capita GDP (Figure 1).

The decline in the level of life of the majority of Chinese can be traced on the basis of a number of independent data series. For example, the average real daily wages dropped to the level of bare physiological survival by the end of the period in question.

Data of *chia-p'u* (several hundred thousand Chinese genealogies of 'middle-class') show that the average age at death dropped from 55–60 years in early Qing cycle to 45 years by the end of the period.

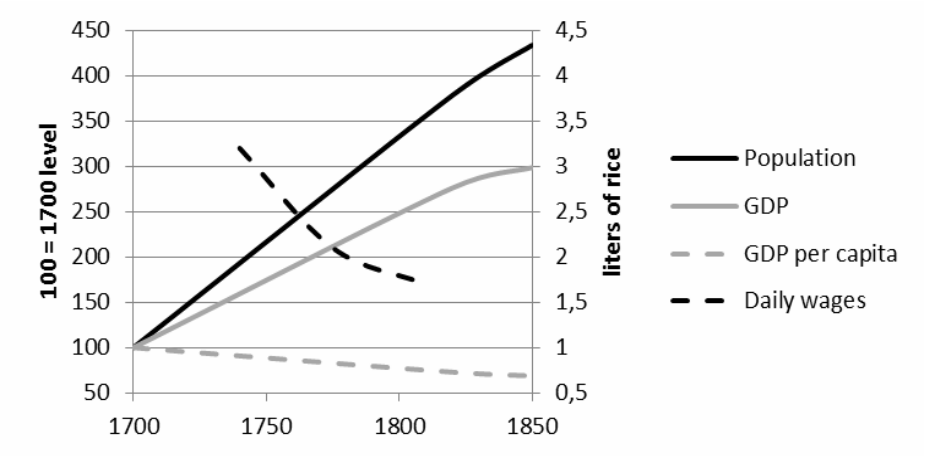

Figure 1. Relative dynamics of GDP, population, and per capita GDP in Qing China (100 = 1700 level) and daily wages (measured in liters of rice), 1700–1850 (data sources Maddison 2010, Chao 1986).

The data on dynamics of female infanticide (Lee et al. 1992: 164, Fig. 5.5). indicate that about five new-born girls were registered per ten new-born boys. However, by the late 1840s the situation became simply catastrophic—this ratio declined to only 1–2 new-born girls per 10 new-born boys. This trend was due to increasing economic hardship: in the Qing China prices of basic food commodities were closely correlated with the levels of female infanticide (Lee et al. 1992: 158–175).

The dramatic decline of the living standards of the majority of the Chinese population naturally led to the increasing dissatisfaction with the government, and eventually, in 1850–1870, a series of rebellions. The Taiping Rebellion was the largest among them (Perkins 1969; Kuhn 1978; Liu 1978) and probably the bloodiest internal political collapse in the history of the humankind. The total number of dead has been estimated as high as 118 million people (Huang 2002: 528). The majority died not as a result of direct violence, but because of diseases, famine, and floods that were a direct consequence of overpopulation. The most destructive effects were produced by the break of the Yellow River dams in 1853, when this great Chinese river changed its course, and a large part of densely populated Northern China was literally washed down (see Kuhn 1978 for details).

The catastrophic change of the Yellow River course had evident Malthusian causes, as the growing overpopulation of its valley led to the increasing

cultivation of the marginal lands upstream, soil erosion and increasing silting of the Yellow River bottom. These developments enhanced the threat of floods, and required increasing the height of counter-flood dams. After the Taiping rebels captured the Chinese 'breadbasket' in the Lower Yangtze region, the revenues of the Qing budget shrank, while military expenses continued to increase. As a result, the Qing government failed to secure the necessary funds for the maintenance of the extremely complex counter-flood system, and the break of the dams by the Yellow River became inevitable (see Korotayev et al. 2006b: Chapter 2 for details).

Demographic transition and the increase in agricultural productivity due to major technological advances in recent centuries allowed most states to escape the Malthusian trap. However, these modernization processes started later in Sub-Saharan Africa than in the rest of the world. Thus, even in the recent decades the Malthusian trap continued to produce state breakdowns in this region.

Consider the example of Ethiopia. In the period preceding the fall of Mengistu Haile Mariam's regime (from 1981 to 1991) Ethiopia's GDP grew by 12.5 percent, while the population grew by 40 percent. As a result, GDP per capita fell from very low $608 to catastrophic $500. Another dramatic fall occurred in per capita calorie intake. 1831 kcal/day in 1981 was already very low, but 1657 kcal/day in 1991 was below physiological minimum (Figure 2).

Such a low level of per capita food consumption means that a large part of the population was on the verge of starvation. As a result, many chose joining rebels (or bandits; it is well known that rebels can be easily transformed into bandits, and vice versa). This was a rational strategy, given the alternative of starving to death, and was a major contributor to the fall of Mengistu Haile Mariam's regime (see Korotayev and Khaltourina 2006).

Political-Demographic Dynamics in Modernizing Systems

Against this background consider the following cases of major political upheavals in recent decades.

- 'Bread riots' in Egypt (1977), the largest political unrest in Egypt after 1952. The participants were chanting "Hero of the Crossing, where is our breakfast?" (addressing President Sadat). The riots took place in all large Egyptian cities, several hundred thousand people participated in them, and there were no fewer than 800 victims (Hirst 1977).
- Iranian Revolution (1979), when millions of Iranians demonstrated against the Shah's regime which was finally overthrown; highest death toll estimates claim 60,000 (see, e.g., Abrahamian 2008).

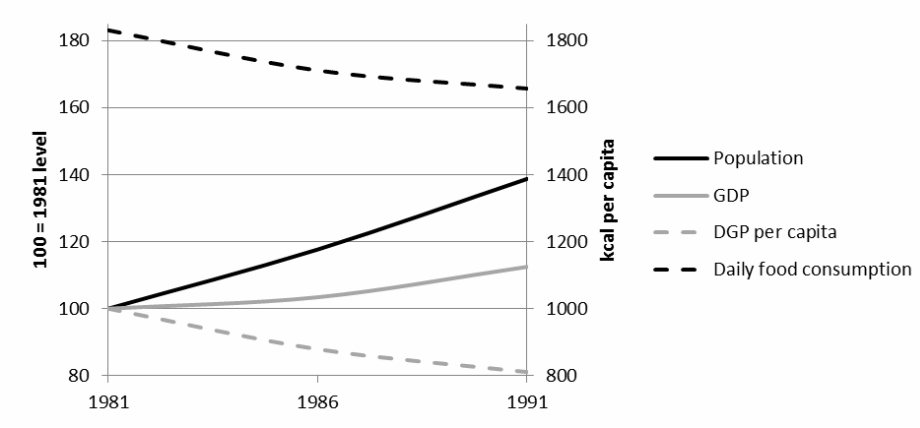

Figure 2. Population, GDP, and food consumption, Ethiopia (1981–1991).

- Civil war in El Salvador (1980–1992), which led to the death of 75 thousand inhabitants of this country—a colossal number for a country with total population of about 4.5 million (Montgomery 1995).
- Kwangju uprising in South Korea (1980), the largest popular uprising after the end of the Korean War, with 300 thousand participants, about 2,000 dead, and five divisions of regular army taking part in the suppression of the rebellion. This uprising was accompanied by a series of popular riots in neighboring cities (Lewis 2002).
- Hama rebellion in Syria (1982), which was the largest popular rebellion in this country after the end of the Second World War. The rebellion was suppressed with regular army units, aviation, artillery, and tanks. According to some estimates, the number of dead reached 40 thousand, including 1000 soldiers of regular army (Fisk 1990; Friedman 1998; Wiedl 2006).
- Liberian civil war (1989–2003), in which about 200–300 thousand Liberians were killed out of the total population slightly more than 2 million at the war start (Huband 1998; Williams 2006).
- Algerian civil war (1990–1998), which started with recurrent strikes and riots by mobs of impoverished Algerian youths and turned into a full-scale armed conflict between the Algerian government and various Islamist rebel groups. Death toll is estimated at 150–200 thousand (Kepel 2006).
- The 'Lottery uprising' in Albania (1997), started by a wave of violent riots caused by the collapse of financial pyramids, as a result of which

> hundreds of thousands Albanians lost all their savings. As is well known, many postsocialist European countries confronted this sort of problem, but nowhere did this lead to a sociopolitical collapse comparable with the Albanian one, with over 2000 killed, one million weapons looted from armories, evacuation of foreign nationals, mass emigration of Albanians to Italy, government resignation, and control over large parts of the country restored only after the deployment of foreign (primarily Italian) troops (Jarvis 1999: 17).

All these events were very large, encompassing a significant part (or even the whole) of the respective country's population and leading to wide-scale political destabilization, huge death tolls, and long-term destructive consequences. Did the Malthusian component play a role in these described events? Indeed, in all these countries, with the exception of Albania and South Korea, fertility rates in the year preceding the upheaval were extremely high (ranging between 4.5 and 7.5 children per woman) compared with the European countries (less than 2 children per woman). However, South Korea went through fertility rate decline only in the few years preceding the upheaval. Albanian birth rates were also low compared with other countries affected by upheavals (although Albania was also the poorest European country with the highest fertility rate in Europe).

What was the effect of such high rates of population increase on per capita food consumption? Contrary to the Malthusian scenario, all countries under investigation were struck by upheavals during periods of rapid increase of per capita food consumption (Figures 3 and 4). Thus, El Salvador, Iran, and Algeria, whose populations in the early 1960s were at the level of undernourishment, or even famine, all managed to achieve a very significant progress in the decades before instability struck. El Salvador increased its per capita food consumption by 700 kcal/day and by 1980— the year when civil war broke out —almost reached the WHO recommended norm of 2300 kcal/capita/day (Naiken 2002). Iran also increased its per capita food consumption by 700 kcal/day (from 1800 in 1960 to more than 2500 in 1979) at the point when the country was swept by the Islamic Revolution. Algeria achieved even better progress, going over the WHO norm in 1977 with continuing growth thereafter. The civil war broke out in 1992 when per capita food consumption reached more than 2900 kcal/day, or nowhere near the undernourishment level (and approaching that of overeating).

In Albania, Egypt, Liberia, South Korea, and Syria, similarly, outbreaks of political violence occurred against the background of rapidly increasing per capita food consumption. Thus, Liberian food consumption went up from 2100 kcal/capita/day in 1960 to 2500 (better than the WHO norm) by 1989, the year of civil war start. Besides, in the year of civil war start Liberia occupied the *first* place in Tropical Africa according to the level of per capita food

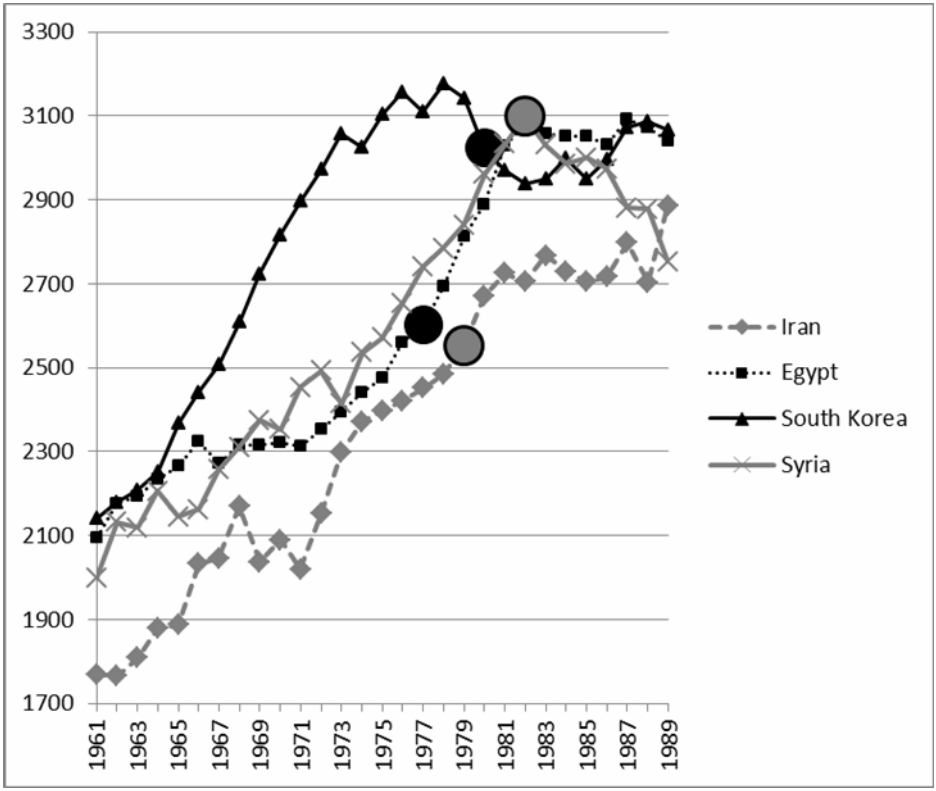

Figure 3. Per capita food consumption (kcal/day) in Egypt, Iran, South Korea, and Syria, 1961–1989 (data source: FAO 2011). Round circles denote the years of violence outbreak.

consumption. Liberian case is more tragic than the others as not only did the country 'stumble' on its way of increasing food consumption, but it also fell back very significantly, and so far has not reached the pre-war level. Albanian case was not so striking, but this country went through a serious upheaval when its per capita consumption had grown far over the WHO norm, reaching 2700 kcal/capita/day.

South Korean achievements in solving the malnutrition problem were even more successful than in Albania. By the mid 1960s the average per capita food consumption in this country exceeded the norm recommended by the WHO and continued to grow thereafter. In 1980, the year of violent Kwangju uprising, per capita consumption in South Korea reached about 3000

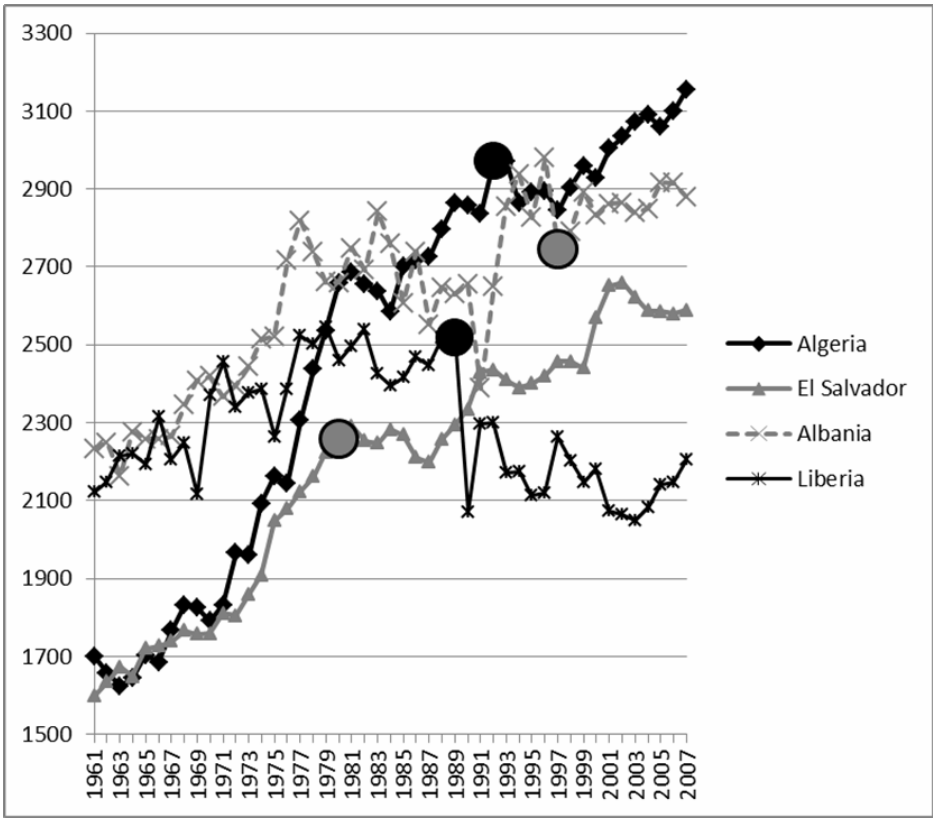

Figure 4. Per capita food consumption (kcal/day) in Algeria, El Salvador, Albania, and Liberia, 1961–2007 (data source: FAO 2011). Round circles denote the years of violence outbreak.

kcal/day, implying the problem of overeating rather than any undernourishment. However, the most remarkable progress was made by Syria: its per capita food consumption grew from 2000 kcal/day in 1960 to the historical maximum of 3100 in 1982, the year of bloody Hama uprising.

One would be inclined to look for some different dynamics in Egypt, where the participants of the 1977 'Bread Riots' chanted "Where is our breakfast?" (Hirst 1977). However, after 1973 per capita food consumption increased rapidly, exceeding 3000 kcal/day in 1982 (the year after Sadat's death). Thus, the problem of overeating became more relevant for Egypt than the one of undernourishment. This success should be attributed to the Infitah economic

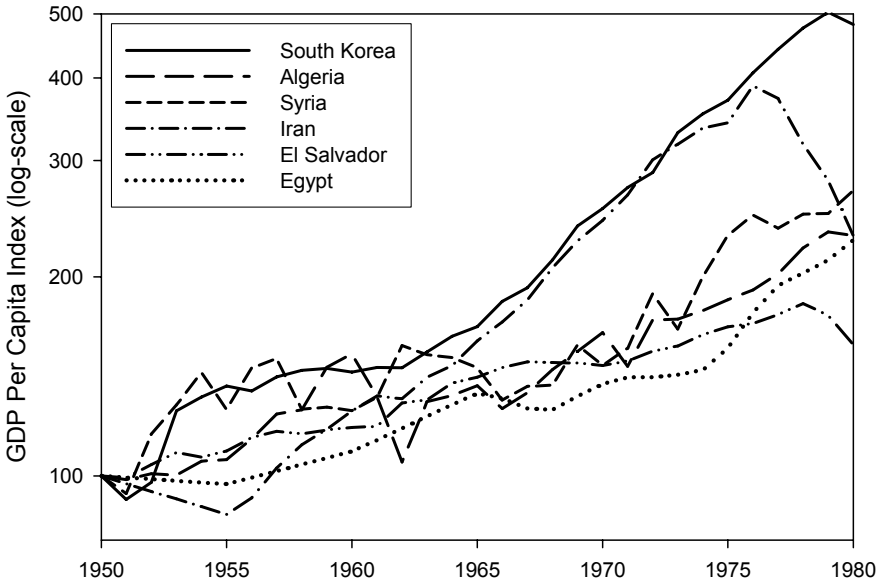

Figure 5. Relative dynamics of GDP per capita, 1950–80 (index, 1950 = 100 percent.

reforms launched by Sadat administration in 1974 (Weinbaum 1985: 215–216). Indeed, though population grew by 36.1 percent from 1970 to 1982, Egyptian GDP grew by 141.1 percent during the same period, the major part of this growth taking place during Infitah. As a result, GDP per capita grew almost twofold, which correlated with the similarly rapid growth in per capita consumption.

Figure 5 clearly shows that in all these countries the period before the upheaval was characterized by increasing GDP per capita. These successes commonly stemmed from socioeconomic reforms, e.g. the so-called 'White Revolution' in Iran (Abrahamian 2008: 123–154), and the 'Infitah' policy in Egypt (Weinbaum 1985: 215–216), as well as from agriculture modernization bringing about significant growth of agricultural output ('Green revolutions').

In summary, all the countries discussed in this section were hit by severe sociopolitical upheavals when GDP growth was outpacing the population growth, and both per capita GDP and per capita food consumption were

growing, in other words, as these countries were successfully escaping the Malthusian trap. However, an escape from the Malthusian trap had certain unanticipated consequences.

Trap at the Escape from Malthusian Trap: Data

The escape from the Malthusian trap implies the solution of the famine problem, which in its turn implies a significant decrease in the death rates. Indeed, for countries with per capita consumption below 2900 kcal/day there is a strong negative correlation between this indicator and the crude death rate ($r = -0.64$, $p << 0.0001$; data source: SPSS 2010). The effect of increasing per capita food consumption on infant and child mortality is even greater (correlation coefficients approach or exceed –0.7 for different model specifications).

Thus, during the first phase of demographic transition, which tends to coincide with the escape from the Malthusian trap, death rate declines dramatically (Vishnevskiy 1976, 2005; Chesnais 1992; Korotayev et al. 2006a), and the greatest decline occurs in infant and child (under five years) mortality. At the same time, birth rates remain high. Thus, out of 6–7 children born by a woman, 5–6 children survive up to reproductive age, not 2 or 3 as earlier. This leads not only to the demographic explosion, but also to the formation of a 'youth bulge,' because the generation of children turns out to be much more numerous than the generation of parents. Many researchers regard the rapid growth of the youth share in population as a major factor of political instability. For example, Goldstone argues that

> the rapid growth of youth can undermine existing political coalitions, creating instability. Large youth cohorts are often drawn to new ideas and heterodox religions, challenging older forms of authority. In addition, because most young people have fewer responsibilities for families and careers, they are relatively easily mobilized for social or political conflicts. Youth have played a prominent role in political violence throughout recorded history, and the existence of a 'youth bulge' (an unusually high proportion of youths 15 to 24 relative to the total adult population) has historically been associated with times of political crisis. Most major revolutions … [including] most twentieth-century revolutions in developing countries—have occurred where exceptionally large youth bulges were present" (Goldstone 2002: 10–11; see also Goldstone 1991; Moller 1968; Mesquida and Weiner 1999; Heinsohn 2003; Fuller 2004).

Urbanization is another process generated by modernization in general and the escape from the Malthusian trap, in particular, which can contribute to

political instability. The escape from the Malthusian trap stimulates urban population growth in several ways. Rapid population growth in a still agrarian economy results in rural overpopulation. The excess population is pushed out of the rural areas as labor productivity grows and less workforce is required for agricultural work. This population is well supplied with food resources as per capita food production increase, which strongly supports the rapid intensification of urbanization processes, allowing for the urbanization levels which could not be achieved in agrarian societies.

Thus, the escape from the Malthusian trap engenders a rapid growth of urban population due to both natural increase and rural-urban migration. This causes social tensions, as jobs and housing need to be supplied for the fast-growing mass of people. In order to prevent increasing unemployment, new workplaces have to be created at the rate of rapidly growing urban population, which is difficult even for a fast-growing economy. If an economy is not growing as fast, unemployment rockets up, especially among the youth (i.e., among that very age cohort which is most inclined to aggression).

Additionally, rural migrants usually don't have skills appropriate for urban settings and can only find unqualified and low-paid jobs, which causes growing discontent among them. The situation is exacerbated by the fact that most of the rural-urban migrants are usually young. The 'youth bulge' and intensive urbanization factors act synergistically. Thus, not only does the most radically inclined part of population explode numerically, it also becomes concentrated near the centers of political system, presenting a serious danger for political stability.

Trap at the Escape from Malthusian Trap: Logical Model

The preceding argument suggests that the emergence of major sociopolitical upheavals at the escape from the Malthusian trap is not an abnormal, but a regular phenomenon. What requires explanation is exceptions, when social systems manage to avoid such shocks during modernization. The logic of the postulated causal connections can be summarized as follows.

1. Escape from the Malthusian trap brings about a precipitous death rate decline and, consequently, an explosive acceleration of the population growth rates.
2. The escape is accompanied by particularly strong decreases in infant and child mortality, which, after a time lag, increases the proportion of the youth in the overall population, resulting in a 'youth bulge.'
3. The part of population most inclined to radicalism increases rapidly.
4. Explosive growth of the youthful cohorts requires the creation of an enormous number of new jobs. Job creation, however, typically lags, and the unemployment among the young grows, creating an 'army' of

potential participants for various political upheavals, including civil wars, revolutions, and state breakdowns.

5. Escape from the Malthusian trap stimulates vigorous growth of the urban population. Excessive rural population is pushed out from the countryside by the growth of agricultural labor productivity. Massive rural-urban migration almost inevitably creates a significant number of those dissatisfied with their current position, as initially the rural-urban migrants mostly can only get unskilled low-paid jobs and low-quality housing.
6. Escape from the Malthusian trap is achieved through the development of new economic sectors and decline of the old ones. Such structural changes cannot proceed painlessly, as old qualification of workers loses its value and, not having necessary new skills, these workers are obliged to take up low-qualified jobs, which make them socially discontent.
7. The young people make up the majority of rural-urban migrants, so the youth bulge and intensive urbanization act together, producing a particularly strong destabilizing effect. Not only does the most radically inclined part of population explode up in numbers, but it also becomes concentrated in major cities/political centers.
8. This can result in serious political destabilization even against the background of a rather stable economic growth. The probability of political destabilization naturally increases dramatically if an economic crisis occurs, or if the government loses its legitimacy due to any other causes (such as military defeats), though the recent Arab Spring events have demonstrated once again that even such triggers may not be necessary.

Figure 6 illustrates the causal interactions postulated by this conceptual model. Mathematical models describing the formation of the youth bulge (that, in combination with some other factors, can lead to major sociopolitical upheavals are well-developed and are widely used in demographic research. A mathematical model based on standard population pyramid calculus and the hypothesis of logistic growth of urbanization (Korotayev 2006) is described in Appendix A, and the urbanization component is in Appendix B.

Testing the Model with Cross-National Data

Our theory predicts that there should be a strong correlation between the growth rate of urban youth population and political violence (see Appendix C for the data on conflicts). Our cross-national test indicates that violent conflicts should be expected in cases when the young urban population grows

by more than 30 percent during 5 years. When this indicator exceeds 45 percent it is very difficult for a country to avoid such upheavals (see Table 1).

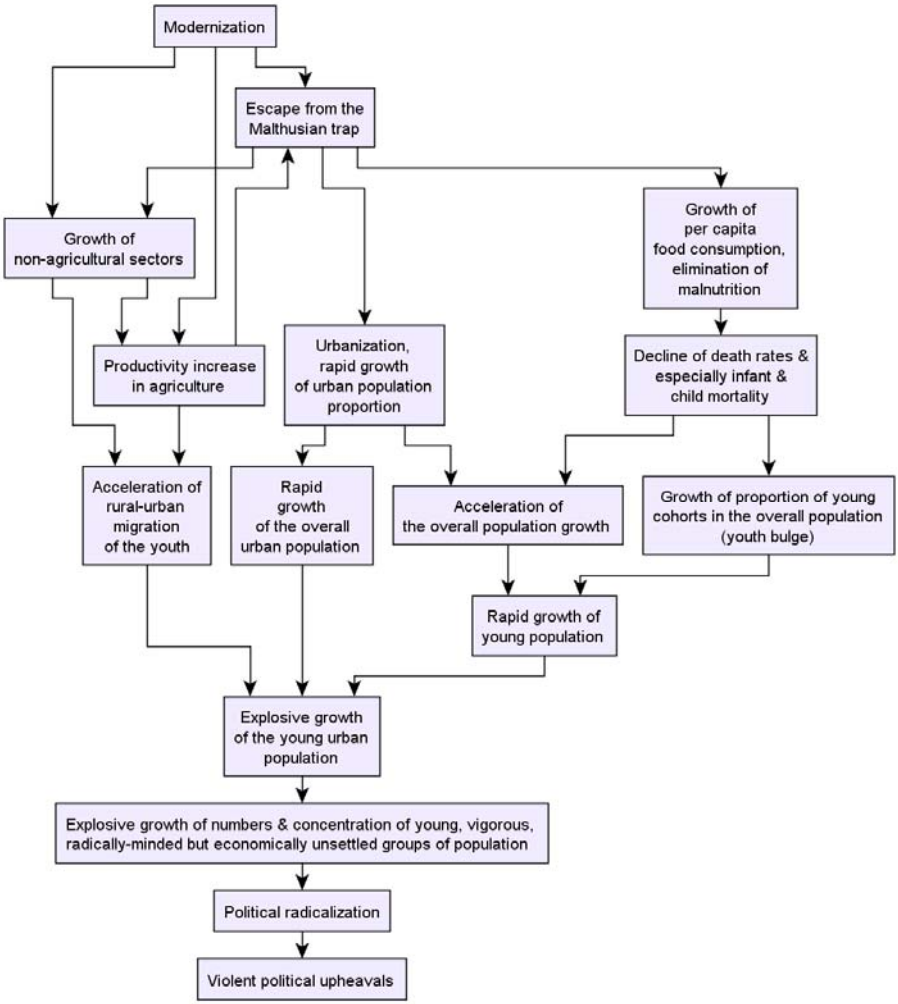

Figure 6. Trap at the escape from Malthusian trap: a flowchart illustrating the model.

Table 1. Correlation between the maximum growth rates of young urban population (percent, per 5-year periods) and the intensity of internal violent conflicts, 1960–2005 (ρ = 0.59, p << 0.0001; γ = 0.74, p << 0.0001). Conflict intensity categories: low = less than 500 violent deaths), medium = between 500 and 100,000 deaths, and high = over 100,000 deaths.

Maximum growth rates of young urban population per 5-year period	*Conflict Intensity*		
	Low	*Medium*	*High*
Very low (< 15 percent), n = 9	89	11	–
Low (15–20 percent), n = 5	60	40	–
Medium (20–30 percent), n = 26	54	46	–
High (30–45 percent), n = 53	26	49	25
Very high (> 45 percent), n = 35	–	53	47

Our results indicate that for 1960–2005 the probability of major internal violent conflicts in countries with very low young urban population growth rates (less than 15 percent increase per 5 years) was very low. For countries with intermediate values of these rates (20–30 percent increase per 5 years) the probability of such conflicts was close to 50 percent. However, even for this group of countries there was not a single occurrence of a particularly violent internal political upheaval in the given period. In countries with high young urban population growth rates (30–45 percent increase per 5 years) the probability of avoiding major political upheavals falls down to a very low level (about one chance out of four). Additionally, the probability of a particularly violent civil war becomes very high in these countries (also about one chance out of four).

In countries in which the young urban population growth rates were very high (>45 percent increase in 5 years) *not a single one* managed to avoid major political shocks. The risk of a particularly violent civil war was very high for these countries (about one chance out of two).

A Forecast of Sociopolitical Instability in African countries, 2011–2050

These empirical results can be used for predicting the risks of sociopolitical instability for the countries being on the verge of escape from Malthusian trap, in the process of escape, or having escaped from it recently. The United Nations Population Division has developed urbanization dynamics forecasts for all the African countries, as well as forecasts of age structure dynamics up to 2050 (UN Population Division 2010). Synthesis of these predictions allowed

us to make a synthetic forecast regarding the dynamics of demographic-structural instability for the African countries in this period.

It is noteworthy that in our prediction only 'positive results' are really significant (i.e. the results revealing the presence of high political instability risk in a certain country in a certain period). We are inclined to interpret such results as evidence for a real risk of political instability in the given place at the given time—assuming that respective governments do not undertake adequate measures in time. On the other hand, in our opinion, 'negative results' cannot be viewed as a guarantee of absence of political upheavals in the given country up to 2050, because we do not claim that the reasons of violent political upheavals can be reduced to demographic-structural factors only.

Let us now consider our forecast of the young urban population dynamics for several African countries. As regards most North African countries, they have advanced in both demographic and urbanization transitions and no significant risks, of the kind studied in this paper, are forecasted for them after 2011 up to 2050. Their young urban population is already close to the saturation level and the prevailing pattern of dynamics in the given period will be mostly produced by demographic waves engendered by the demographic explosion of c.1960–85 and subsequent rapid birth rate decline.

However, in early 2011 a number of North African countries were still in the youth bulge zone, with the bulge just having reached its peak and about to start declining (Figure 7). Youth bulges certainly played a crucial role in the Arab Spring. Hence, recent political upheavals in North Africa can be classified as a very special sort of the trap, a 'trap at the *very* escape from the Malthusian trap.' Note that this sort of trap has its rather important peculiarities.

No serious demographic-structural risks of the type in question are forecasted after 2011 for some Sub-Saharan countries (especially in Southern Africa). Thus, in Gabon and Botswana the young urban population growth curve quite clearly demonstrates the absence of major demographic- structural risks (Figure 8).

A bright example is represented by Ghana (see Figure 7), where the forecasted situation may seem truly threatening, as by 2050 the young urban population there is likely to grow almost threefold (i.e., 200 percent; while in the cases considered above this growth did not exceed 50 percent). However, analysis of the corresponding time series shows that in the following decade urban youth relative growth rates are forecasted to be decreasing in Ghana up to a quite safe level of less than 14 percent during 5 years; in 2020s these rates are going to stabilize (at the same rather safe level), while after 2030 they will decline further. A similar dynamics is demonstrated by the absolute growth rates of the young urban population.

Nevertheless, the forecast indicates the presence of high demographic-structural risks for a wide range of Tropical African countries (see Table 2 below for a full list). Fortunately, in no case the urban youth

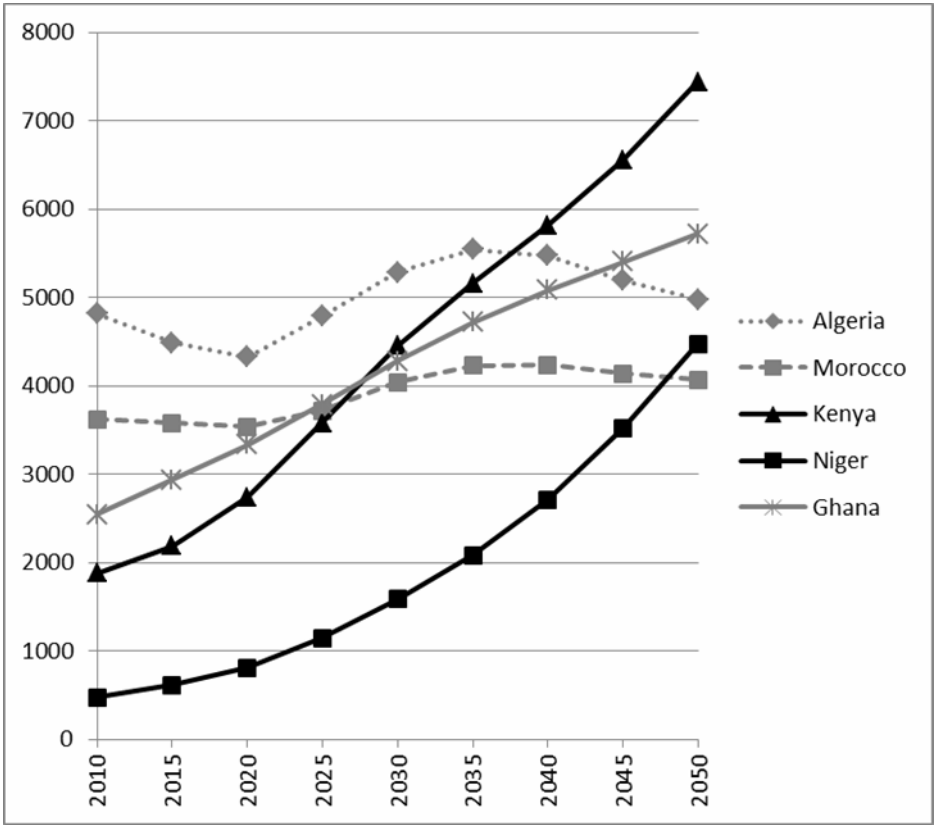

Figure 7. Young urban population dynamics (in thousands) in Algeria, Ghana, Kenya, Morocco, Niger, forecast to 2050.

growth rates are forecasted to exceed the critical level of 45 percent per 5 years. Still, a number of tropical African countries are forecasted to get into a very dangerous zone of 30–45 percent (only a quarter of countries in this zone managed to avoid major internal political conflicts, while in a quarter of cases the upheavals were particularly violent). Kenya is among the countries of high demographic-structural risk. In 2005–2050 a 4.5-time increase in the young urban population is forecasted for Kenya, while in the 2020s the relative growth rates of this indicator will exceed the critical level of 30 percent per 5 years. However, the most serious demographic-structural risks are predicted for Niger, where in 2000–2050 the young urban population will increase by an

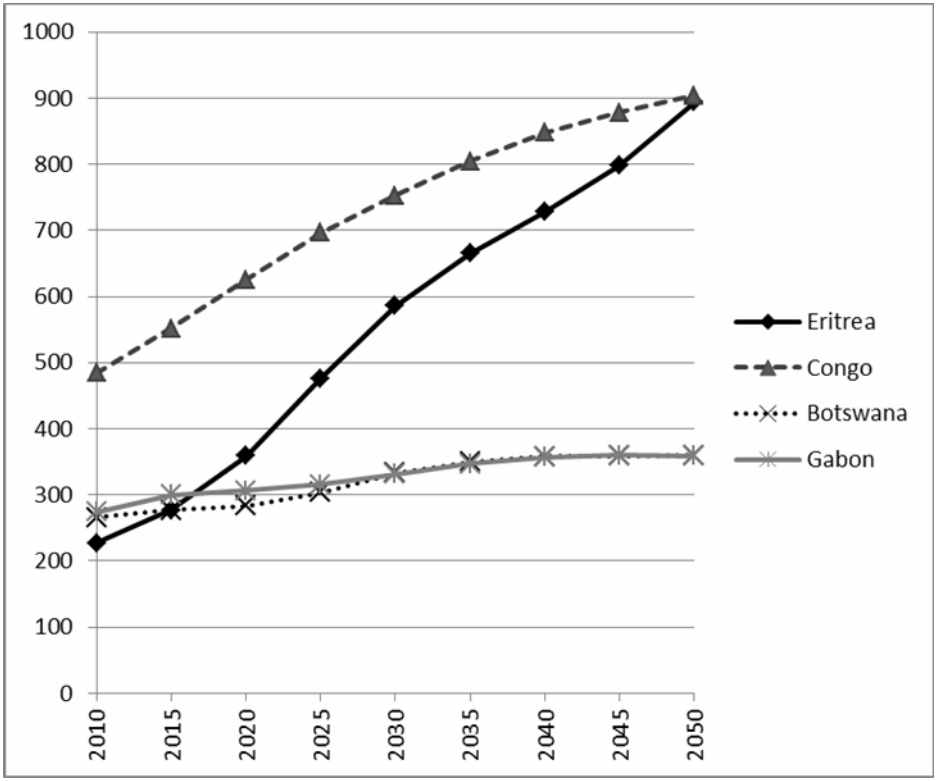

Figure 8. Young urban population dynamics (thousands) in Botswana, Congo, Eritrea, and Gabon, forecast to 2050.

order of magnitude; in late 2010s the relative growth rates of this indicator will exceed the critical level of 30 percent per 5 years, while in the early 2020s they will exceed an even more dangerous level of 40 percent during 5 years. These rates will decrease to relatively safe levels only in the late 2040s (Figure 9).

Postscript: the Arab Spring of 2011

This article was submitted to review before the events of the Arab Spring and this Postscript was added after the first round of reviews. First, we would like to acknowledge that our model does not capture all possible causes of revolutions. Therefore the purpose of the Postscript is to examine the events of the Arab Spring in light of the model, and to see how the model fares.

Table 2. Summary forecast of demographic-structural risks of political destabilization in African countries to 2050

Country	*Years of maximum urban youth growth rates*	*Urban youth growth rates in those years*	*High risks of political destabilization*	*Demographic-structural risk level*
Niger	2021–2025	41.8	2021–2030	Very high
Malawi	2011–2015	39.0	2011–2020	High
Burkina Faso	2021–2025	38.7	2021–2030	High
Uganda	2021–2025	33.1	2021–2030	High
Eritrea	2021–2025	32.5	2021–2030	High
Tanzania	2021–2025	30.6	2021–2030	High
Kenya	2021–2025	30.2	2021–2030	High
Rwanda	2021–2025	29.6	2021–2030	Medium
Chad	2016–2020	28.5	2016–2025	Medium
Burundi	2026–2030	28.1	2026–2035	Medium
Congo, Dem. Rep.	2011–2015	27.7	2011–2020	Medium
Mozambique	2021–2025	27.4	2021–2030	Medium
Somalia	2016–2020	27.4	2016–2025	Medium
Ethiopia	2011–2015	26.7	2011–2020	Medium
Gambia	2011–2015	26.5	2011–2020	Medium
Sierra Leone	2016–2020	25.4	2016–2025	Medium
Madagascar	2011–2015	25.2	2011–2020	Medium
Guinea	2021–2025	24.2	2021–2030	Low
Mali	2021–2025	24.1	2021–2030	Low
Zimbabwe	2011–2015	23.5	2011–2020	Low
Benin	2021–2025	22.6	2021–2030	Low
Comoro Islands	2021–2025	22.6	2021–2030	Low
Sudan	2011–2015	22.4	2011–2020	Low
Zambia	2016–2020	22.3	2016–2025	Low
Namibia	2011–2015	22.0	2011–2020	Low
Equatorial Guinea	2026–2030	21.6	2026–2035	Low
Angola	2011–2015	21.5	2011–2020	Low
Guinea-Bissau	2021–2025	21.5	2021–2030	Low
Liberia	2011–2015	21.2	2011–2020	Low
Côte d'Ivoire	2011–2015	20.3	2011–2020	Low
Togo	2011–2015	19.8		Very low

Table 4, continued. Summary forecast of demographic-structural risks of political destabilization in African countries to 2050

Country	*Years of maximum urban youth growth rates*	*Urban youth growth rates in those years*	*High risks of political destabilization*	*Demographic-structural risk level*
Togo	2011–2015	19.8		Very low
Senegal	2021–2025	19.3		Very low
Nigeria	2011–2015	19.2		Very low
Cameroon	2021–2025	17.4		Very low
Lesotho	2011–2015	16.7		Very low
Swaziland	2026–2030	16.4		Very low
Mauritania	2021–2025	16.0		Very low
Sao Tome and Principe	2016–2020	15.7		Very low
Ghana	2011–2015	15.3		Very low
Central African Rep.	2016–2020	15.0		Very low
Congo	2011–2015	14.0		Absent
Libya	2016–2020	12.3		Absent*
Egypt	2021–2025	11.6		Absent*
Algeria	2021–2025	10.7		Absent*
West. Sahara	2026–2030	10.2		Absent
Gabon	2011–2015	9.7		Absent
Botswana	2026–2030	9.6		Absent
Morocco	2026–2030	8.6		Absent*
Mauritius	2031–2035	8.4		Absent
Tunisia	2026–2030	7.3		Absent*
Djibouti	2011–2015	6.0		Absent
Cape Verde	2011–2015	5.4		Absent
South Africa	2021–2025	5.3		Absent
Reunion	2021–2025	4.6		Absent

*Absent after 2011

The 'Escape from the Trap' dynamic has been an important contributor to the 2011 Egyptian Revolution, and to most of other Arab Spring uprisings. However, the mechanisms of the "Arab Spring" explosions have certain peculiarities that differentiate them from the classical model of the 'Escape from the Trap' discussed above.

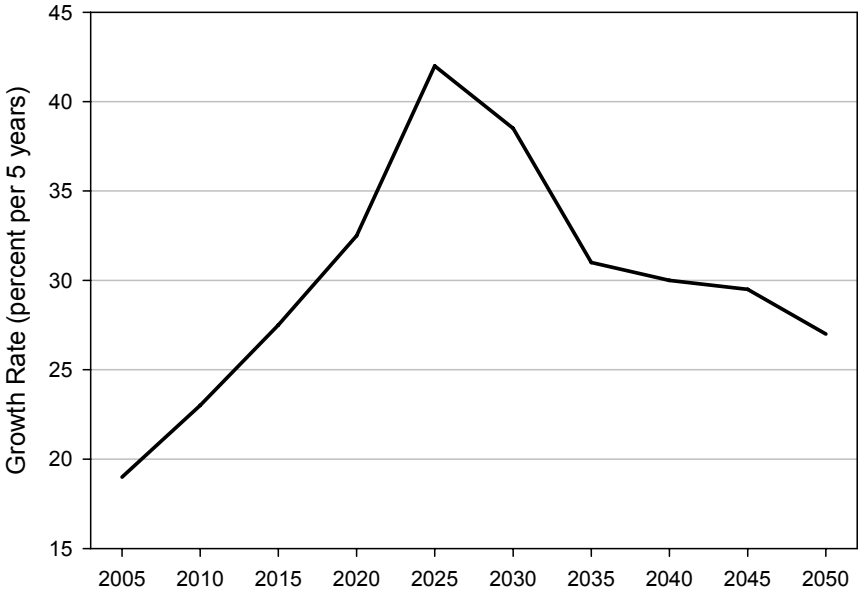

Figure 9. Forecasts of relative growth rates of the young urban population in Niger to 2050 (percent per 5-year periods).

To start with, the Arab spring explosions (with a notable exception of Yemen that we will discuss in more detail below) occurred when the respective countries were at the very end of the Escape from the Trap. The year 2011 was one of the last years when these countries had critically high youth:adult ratios, and the post-2011 forecast suggests that these ratio will rapidly decline to safe levels (Figure 10). In terms of absolute numbers, on the other hand, have been growing rapidly in the last two decades and peaked right around 2010 (Figure 11).

Let us consider the Egyptian Revolution in greater detail. It is not surprising that Mubarak's administration 'overlooked' the social explosion. Indeed, statistical data correctly indicated that the country was developing very successfully. Economic growth rates were high (even in the crisis years). Poverty and inequality levels were among the lowest in the Third World. Global food prices were rising, but the government was taking serious measures to mitigate their effect on the poorest layers of the population. Unemployment level (in percent) was less than in many developed countries

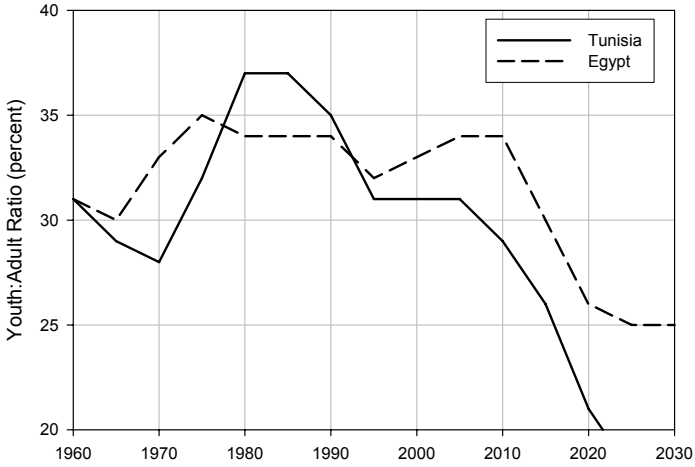

Figure 10. Youth bulges in North African countries: the proportion of youth (aged 20–29) to overall adult (> 19 year old) population for 1965–2010 with a forecast to 2020.

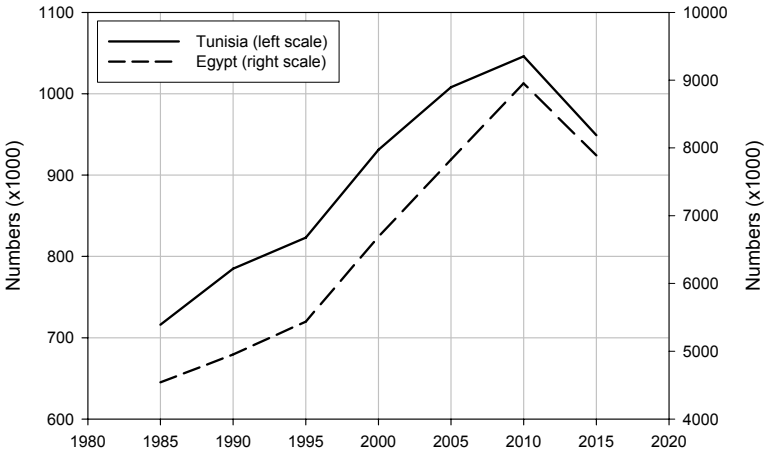

Figure 11. Dynamics of the absolute numbers (× 1000) of the young (20–24 year old) in Tunisia and Egypt, 1985–2010, with a forecast to 2015 (data source: UN Population Division 2011).

and, moreover, was declining, and so were population growth rates. What would be the grounds to expect a full-scale social explosion? Naturally, the administration was aware of the presence of certain groups of dissident 'bloggers,' but how could one expect that they would be able to inspire great masses of people to go to Tahrir?

It was even more difficult to predict that Mubarak's regime would be painfully struck by its own modernization successes, which led to the sharp decline of crude death rate and, especially, of infant and child mortality in 1975–1990. Without these successes many young Egyptians vehemently demanding Mubarak's resignation (or even death) would have been destined to die in early childhood and simply would not have survived to come out to the Tahrir Square (Korotayev and Zinkina 2011a, 2011b). Indeed, as great successes were achieved in bringing down infant and child mortality rates (while birth rates still remained high and started to decline only after a long lag) a very numerous generation of children emerged in the Egyptian population structure, which after 20 years fed the huge youth bulge (Figure 20).

Note further that the rate of unemployment in Egypt stayed almost unchanged in the recent two decades while the number of the young doubled. At the beginning of the 2011 Egyptian Revolution the unemployment level in Egypt was about 9 percent which was not particularly high according to global standards. However, the most important circumstance (caused solely by the youth bulge) is that about half of all the Egyptian unemployed belonged to the 20–24 age cohort (Al-jihaz… 2010). Total number of the unemployed on the eve of the Egyptian Revolution was about 2.5 million (Abd al-Rahman 2010: 4). Accordingly, on the eve of the Revolution Egypt had about one million of unemployed people aged 20–24 who made up the main striking force of the Revolution. The absolute number of the unemployed young people increased by a factor of at least two.

Moreover, the investigation carried out at the end of 2010 by the Egyptian Central Agency for Public Mobilization and Statistics discovered that on the eve of the Revolution more than 43 percent of the Egyptian unemployed had university degrees (Al-jihaz… 2010). Thus, the 2011 Egyptian Revolution (and most of the other Arab Spring events) was fueled by not only young, but also highly educated. This circumstance may explain a relatively small number of victims during these uprisings. Indeed, though the scale of the events was truly colossal and millions of people were involved for weeks, only 300 were killed (mostly by the security forces and criminal elements employed by the security forces, but not by the protesters). In contrast during the bread riots of 1977 (when low-educated Egyptian urban youth was the main striking force) 800 people were killed just during two days (Hirst 1977). In this regard the 2011 Egyptian Revolution was closer to the youth uprisings of the 1968 type and 'velvet revolutions' in Europe and North America of the past decades, than to

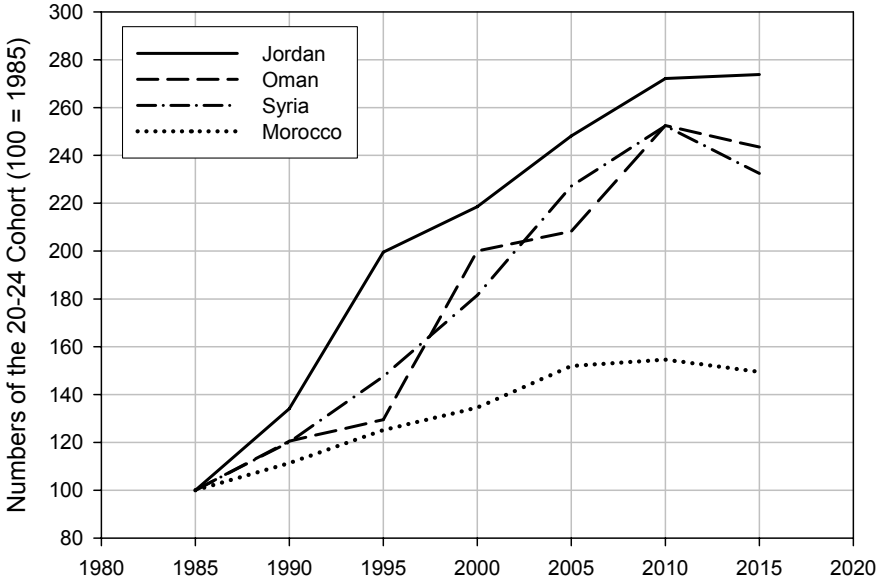

Figure 12. Relative dynamics of the young (20–24) population, 100 = 1985 (1985–2010, with a forecast to 2015) in Jordan, Oman, Syria, and Morocco (data source: UN Population Division 2011).

violent and bloody civil wars in the Third World (involving dozens and hundreds thousands, if not millions deaths).

The peak of the 20–24 year old young cohort population was also observed in Syria, Oman, and Jordan (Figure 12). The Moroccan youth bulge was the least pronounced, and perhaps it was not a coincidence that the Arab Spring events in this country were the least pronounced.

In other Arab countries the 20–24 cohort reached a peak either before 2011, or is predicted to peak in the future (see supplementary figures in Appendix D). Libya and Algeria are in the first group, because the 20–24 cohort peaked there in 2005. Correspondingly, 2010 was the peak of the 25–29 cohort. Perhaps this is the reason why the Arab Spring events there were of relatively low intensity (in comparison with Tunisia and Egypt). On the other hand, the 20–24 cohort will reach a peak in Bahrain and Yemen only in the future—around 2020 in Bahrain and towards 2050 in Yemen. This difference

is caused by the fact that Yemen lagged far behind the other Arab countries as regards both life expectancy/death rate and the total fertility/crude birth rates. Other Arab countries that lag significantly behind the rest of the Arab world in their demographic transition and where, consequently, significant demographic-structural risks of sociopolitical destabilization will persist in the forthcoming future are Mauritania, Iraq, and, especially, the Palestinian Autonomy (see supplementary figures in Appendix D). While the absolute numbers of young population in the countries of the Arab 'mainstream' will stabilize in the forthcoming decade, in Iraq this cohort will continue to grow rapidly up to the 2020s. In Mauritania growth of the 20–24 cohort will continue up to the 2030s, although it will be not as fast as in Iraq. However, the Arab countries with the highest future demographic-structural risks are Yemen and Palestine, where the numbers of youths will continue to grow rapidly into the 2040s.

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