THE TOLL OF WAR

THE ECONOMIC AND SOCIAL CONSEQUENCES OF THE CONFLICT IN SYRIA

WORLD BANK GROUP

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Front cover:
A Syrian woman waits with her daughter near the Syria border at the southeastern town of Suruc in the Sanliurfa province after crossing the border between Syria and Turkey after several mortars hit both sides on October 2, 2014 by Bulent Kilic/AFP/Getty Images.

ACKNOWLEDGMENTS

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KEY FINDINGS

- *This study assesses the economic and social consequences of the Syrian conflict as of early 2017.* The conflict has inflicted significant damage to the Syrian Arab Republic's physical capital stock (7 percent housing stock destroyed and 20 percent partially damaged), led to large numbers of casualties and forced displacement (between 400,000 and 470,000 estimated deaths and more than half of Syria's 2010 population forcibly displaced), while depressing and disrupting economic activity. From 2011 until the end of 2016, the cumulative losses in gross domestic product (GDP) have been estimated at $226 billion, about four times the Syrian GDP in 2010.

- *Disruptions in economic organization have been the most important driver of the conflict's economic impact, superseding physical damage.* The conflict has not only ended lives and destroyed productive factors; it has also severely diminished economic connectivity, reduced incentives to pursue productive activities, and broken economic and social networks and supply chains. Simulations show that cumulative GDP losses due to such disruptions in economic organization exceed that of capital destruction by a factor of 20 in the first six years of the conflict. This is mainly because a "capital destruction only" shock works like some natural disasters (unanticipated and sudden onset): in a well-functioning economy, its effects on investments are limited (only a 22 percent reduction in simulations). Thus, capital is rapidly rebuilt and further economic repercussions are contained. In comparison, disruptions in economic organization decrease investments significantly (a simulated 80 percent reduction) by reducing profitability; therefore, the initial effects are propagated strongly over time. This contrast between different types of shocks helps us to put future reconstruction efforts into perspective. Without rebuilding economic institutions and restoring economic networks, replacing the capital stock by itself will not go far in helping the economy recover.

- *The longer the conflict continues, the more difficult the post-conflict recovery will be.* Although the rate of deterioration moderates over the course of the conflict, the effects become more persistent. Should the conflict end in its sixth year (baseline), GDP recoups about 41 percent of the gap with its pre-conflict level within the next four years. Overall, the cumulative GDP losses will reach 7.6 times the 2010 GDP by the 20th year. In comparison, GDP recoups only 28 percent of the gap in four years if the conflict ends in its 10th year (alternative scenario), and cumulative losses will be at 13.2 times the 2010 GDP. Simulations also show that outmigration could double between the sixth year of the conflict and the 20th year, in the case of a continued conflict. These results do not capture many other complications, like political economy challenges such as conflict-driven grievances. Adding these factors would only reinforce the main findings of the report: the longer the conflict persists, the deeper the grievances and divisions will run in the Syrian society, rendering it very difficult to build efficient institutions and effective economic mechanisms.

EXECUTIVE SUMMARY

The Arab Spring protests marked the beginning of a new era in the Syrian Arab Republic in 2011. Minor public protests began almost immediately after the initial protests in Cairo in January 2011. The first large demonstrations began two months later in March, and the following months saw a process of escalation as demonstrations spread and increased in size within the country. By the summer of 2011, the armed conflict was already unfolding. Now in its sixth year, the Syrian conflict remains active and is bringing much pain and tragedy on a daily basis.

This study provides an assessment of the conflict's impact on economic and social outcomes in Syria as of early 2017. Conflicts destroy tangible and intangible assets and leave deep marks on a country's social fabric, culture, and collective memories. The Syrian conflict has quickly become a particularly harsh example of this. It is, unfortunately, not possible to capture all of these consequences in a comprehensive manner. As of March 2017, the conflict was active, and some longer-term outcomes and political, social, security-related, and institutional effects were not yet observable beyond anecdotal evidence. In addition, because of the ongoing conflict, the country has remained inaccessible to the team who produced this report, and severe data shortages forced the team to leave out much-needed analysis. Given these constraints, the analysis focuses on taking stock of the effects of the conflict in four areas: (i) physical damage, (ii) loss of lives and demographic dispersion, (iii) economic outcomes, and (iv) human development outcomes.

The strength of this study lies in its scope and methodology. The novel part of the data used in this study is provided by remote sensing assessments (with media verification), which focused on ten cities[1] and six sectors[2], and then extrapolated to eight governorates[3] by using conflict intensity and asset base comparisons. Information from partner agencies in demography and sector and economic outcomes supplemented these assessments. The novelty of the analysis itself lies in its integrative framework. The results of the physical damage and loss of lives are used to employ an integrative model to match observed economic outcomes, including GDP patterns and demographic mobility (inter-governorate and outmigration from Syria). This approach provided several advantages. First, the distinct roles played by physical destruction, casualties, and economic disorganization in how conflict has manifested its impacts were separated. This separation is important because it could help prioritize actions in a future recovery and reconstruction process, by facilitating a comparison between alternative scenarios of aid composition.

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[1] These cities are Aleppo, Raqqa, Dar'a, Douma, Dayr az-Zawr, Homs, Hama, Idlib, Kobani, and Tadmur (also called Palmyra) which were chosen on the basis of several criteria, including conflict intensity, geographical representation, and being an important source or destination of internally displaced persons.
[2] These sectors are education, energy, health, housing, transportation, and water and sanitation.
[3] These governorates are Aleppo, Dar'a, Dayr az-Zawr, Hama, Homs, Idlib, Raqqa, and Rif Dimashq, which were chosen because of conflict intensity.

Second, it helped compare the results of alternative scenarios that are not observable from actual data: for example, what is the role played by migration in the conflict's economic impact? How far can the impact of the conflict on economic outcomes prevail after the cessation of the conflict? The report discusses these in detail. (Figure ES.1 shows the organization of the study.)

Figure ES.1: Organization of the study
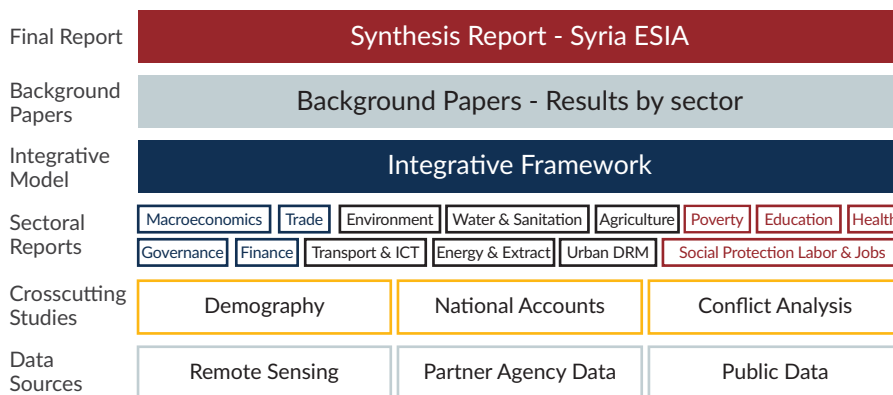
Syria Before the Conflict

On the eve of the 2011 unrest, Syria was a fast-growing, lower-middle-income country. In aggregate terms, the Syrian economy was improving, albeit starting from an unfavorable base, during the 2000s. Gross domestic product (GDP) grew at an average of 4.3 percent per year from 2000 to 2010 in real terms, which was almost entirely driven by growth in non-oil sectors, and inflation averaged at a reasonable 4.9 percent.

The strong growth performance, however, did not translate into broad-based economic and political inclusion and further transparency and civil liberties. Syria was comparable to other regional economies in many socioeconomic indicators in 2010. The multidimensional poverty rate (5.5 percent) and income inequality (Gini index: 32.7) stood close to regional averages. However, the labor force participation (LFP) rate in Syria (43.5 percent) was one of the lowest in the world, low even by regional standards (the Arab Republic of Egypt and Tunisia had 49 and 47 percent LFP, respectively). This was primarily driven by the extremely low, and decreasing, role of women in the economy (LFP about 5 percentage point lower than the average for the Middle East and North Africa (MENA), which is already low by global standards, and female unemployment, at 25.2 percent, the highest in the region). Similarly, the country consistently performed unfavorably in governance and civil liberties–related indicators during the 2000s. Syria's

ratings on measures of freedom of association and assembly, and freedom of expression and belief, were low even compared with other countries in MENA.

Another important feature of Syria's governance landscape prior to 2011 was the country's high levels of perceived corruption and low trust in public institutions. According to global indexes, Syria's rankings on control of corruption and control of economic monopolies declined after 2005. Although the country had already trailed the middle-income MENA peers, like Egypt, Jordan, and Tunisia, on both fronts in 2005, the gap widened substantially by 2010. These trends also undermined citizen trust in public institutions. Gallup surveys from 2009–10 show that the percentage of Syrians expressing trust in key public institutions, such as local police and the judicial system, was lower than comparators. For instance, in 2010, only 48 percent of Syrians reported trust in local police; in comparison, about 87 percent of Jordanians responded favorably.

Added to these enabling conditions were external factors that contributed to the onset of the conflict. The Arab Spring and a sudden shift in the regional context, where armed rebellions became easier, as well as the actions chosen by various parties, led to a quick escalation of the initial protests, from civil unrest to a long and intense armed conflict. Fueled by a "loser loses all" logic, which prevented a reasonable and compromising resolution, the conflict has persisted and intensified over time, leading to devastation for all.

The Wrath of Conflict

The conflict has inflicted extensive damage on Syria's physical infrastructure. Cities like Homs, Aleppo, and Damascus, and many smaller towns, have served as battlegrounds for government and rebel offensives, with tragic consequences for their inhabitants. Over time, the conflict has caused the partial or full breakdown of urban systems in many cities by destroying houses and public service–related infrastructure like roads, schools, and hospitals, while leading to economic collapse in many areas. As bridges, water resources, grain silos, and other economically significant assets became strategic targets, the physical damage ratios increased. Across the 10 cities on which this study focuses, 27 percent of the housing stock has been impacted, with 7 percent destroyed and 20 percent partially damaged. The percentage varies across cities, with the highest full destruction occurring in Dayr az-Zawr (10 percent) and the highest partial damage in Tadmur (also called Palmyra, 32.8 percent). With 8 percent destroyed housing units and 23 percent partially damaged, Aleppo is also among the worst impacted cities. Across the eight governorates, about 8 percent of the housing stock has been destroyed and 23 percent partially damaged. The damage has been particularly high in the health sector, as medical facilities were specifically targeted. Estimates show that about half of all medical facilities in the eight governorates studied in this report have been partially damaged, and about 16 percent of them were destroyed. The results are similar in education sector facilities (53 percent partially damaged, and 10 percent destroyed).

Disruptions in economic networks, human capital, and connectivity have greatly magnified the effects of physical damage on public service delivery. Physical damage reflects only a subset of the effects the conflict has imposed on public service delivery in Syria. The available evidence suggests that physical damage to the electricity infrastructure has been severe, but not devastating: all the country's hydroelectric dams and six of 18 power plants remain operational, while four more power plants are partially damaged, and one has been destroyed. However, fuel shortages and conflict-driven constraints to operation and maintenance have led to a sharp drop in public power supply. Power generation declined to 16,208 gigawatt-hours (GWh) in 2015, compared with 43,164 GWh in 2010, a drop of 62.5 percent. Much of this decline appears to be due to fuel shortages, as available generation capacity declined by about 30 percent in the same period. The decline in electricity supply has caused major disruptions. The majority of cities receive only a few hours of electricity a day. The government has applied a rationing policy via load shedding throughout the country, which affects the delivery of other services, like water, education, and health care services.

Among all the consequences of the conflict, the effects on human lives and demographic displacement have been the most dramatic. The pre-conflict population of Syria was estimated at 20.7 million in 2010 (World Development Indicators). Since 2011, the conflict has created a complex set of pressures on the country's population. The most recent calculations by the International Organization for Migration (IOM) put the population within Syria at 18.8 million as of November 2016. Data limitations render a precise and comprehensive decomposition of the demographic changes impossible: conflict affects fertility rates and life expectancy alike. In addition, an important portion of demographic movements takes place informally: some refugees remain unregistered and, in certain cases, migrants do not factor into in-country population or refugee totals. The casualties that are directly related to conflict are estimated between 400,000 (UN, as of April 2016) and 470,000 (Syrian Center for Policy Research, as of February 2016).

Syria has become the largest forced displacement crisis in the world since World War II. Over half of the country's pre-conflict population has been forcibly displaced. According to the United Nations High Commissioner for Refugees, the total number of Syrians presently registered as refugees outside the country in Lebanon, Turkey, Jordan, Iraq, Egypt, and North Africa is 4.9 million. In addition, more than 800,000 Syrian nationals are estimated to have sought asylum in Europe in 2015 and 2016. Many of these individuals have moved more than once, and have not been removed from registration lists in their first country of refuge. These numbers also do not include an estimated 0.4 million to 1.1 million unregistered Syrian refugees in Lebanon, Jordan, Turkey and Iraq. The number of internally displaced persons was at 5.7 million as of January 2017, with 56 percent of them remaining within their own governorates. Although those who moved within their governorate may be more likely to return to their original communities, the return migration so far has been small (0.56 million) compared with the total numbers of displaced.

The losses in GDP between 2011 and 2016 sum to about four times the size of the Syrian GDP in 2010. The destruction of physical capital, casualties, forced displacement, and breakup of economic networks has had devastating consequences for Syrian economic activity. Syria's GDP was estimated to have contracted by 61 percent between 2011 and 2015 in real terms, and by an additional 2 percent in 2016—a 63 percent decline compared with its 2010 GDP. Estimates of national account indicators, including counterfactual GDP numbers estimated by using statistical estimation methods, show that the actual GDP fell $51 billion (in 2010 prices) short of the counterfactual GDP in 2016. Aggregating these differences between counterfactual and actual GDP numbers between 2011 and 2016 shows that the cumulative loss in GDP amounts to $226 billion in 2010 prices, about four times the 2010 GDP.

Economic disruption has been particularly devastating in the hydrocarbons sector. The oil GDP declined by 93 percent during the same period, while the non-oil economy contracted by 52 percent due to the severe destruction of infrastructure, reduced access to fuel and electricity, low business confidence, and disruption of trade. Hydrocarbon production plunged from 383,000 barrels per day (bpd) in 2010 to 10,000 bpd in 2015 and 2016, due to Islamic State control over most of the oil-producing areas.[4] Agricultural production also registered significant losses as a result of damage to irrigation systems and shortages of labor and inputs such as seeds, fertilizers, and fuel. The most severe contraction of the economy took place in 2012 and 2013, when economic activity shrank by 29 and 32 percent, respectively, as fighting intensified and spread across the country.

The Syrian economy suffers from severe twin deficits, depleted foreign exchange reserves, and an unsustainably high public debt. Conflict-related disruptions and international sanctions reduced Syrian exports by 92 percent between 2011 and 2015. The current account deficit was estimated to have reached 28 percent of GDP in 2016, up from 0.7 percent of GDP in 2010. The gap has increasingly been financed by withdrawing foreign exchange reserves, which declined severely, from nearly US$21 billion in 2010 to less than US$1 billion in 2015. Fiscal revenues dropped from 23 percent of GDP in 2010 to less than 3 percent of GDP in 2015. This was mainly due to losses in oil and tax revenues, the collapse of international trade due to sanctions, a growing informal economy, and weak administrative collection capacity. In response to this shortfall, government spending was cut back (especially capital expenditures), but these measures were not enough to offset the fall in revenues. As a result, gross public debt rose from 30 percent of GDP in 2010 to a staggering 150 percent of GDP in 2015.

Rapidly shrinking job opportunities and scaled down social security programs have further aggravated a mounting humanitarian crisis. Since the

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[4] This refers to oil in areas under government control, but with the fields under rebel control, oil production is estimated at 40,000 bpd.

onset of the conflict, jobs were destroyed at an estimated rate of approximately 538,000 per year on average between 2010 and 2015, adding 482,000 people to the unemployment pool every year. More than three in four Syrians of working age (7.7 percent, or nine million individuals) are not involved in any economic value generation: 2.9 million of them are unemployed and 6.1 million are inactive. Unemployment among youth reached 78 percent in 2015. Facing a mounting fiscal problem, the Syrian Government dramatically decreased subsidies. Prices of fuel oil increased 10-fold from 2011 to 2015. As for rice and sugar, prices increased 2.3-fold in the same period. Estimates for this report suggest that approximately six in 10 Syrians live in extreme poverty today. As of December 2016, 5.8 million individuals received in-kind food assistance. The World Food Programme alone distributes more than four million food baskets (supplements for about 1,700 kilocalories per day) each month.

Disentangling the Economic Effects of the Conflict

Which channel has been the most important in delivering the conflict's impact on the Syrian economy? The discussions have so far focused on many of the conflict-driven factors that have affected the well-being of Syrian citizens. These include casualties, forced displacement, physical destruction, limitations on the mobility of goods and people, and a vast amount of foregone opportunities. These multidimensional effects, however, comprise overlapping components. Some of the most useful pieces of information, for example, the relative importance of physical destruction, migration, and so forth, in generating the economic impact of the conflict, are not directly observable. To address some of these concerns, this study adopted an integrative framework that helps disentangle the channels of transmission of the effects of the conflict. The analysis also introduced several policy-related scenarios that could inform future recovery and reconstruction efforts.

Capital destruction, by itself, accounts only for a small share of the conflict's economic impact. If the conflict only destroyed capital (at the same rate it has done so far), without other effects (capital-destruction-only scenario), its impacts on income and welfare would be relatively limited. By the sixth year of the conflict, the cumulative losses in GDP would only be 5 percent of the actual loss if the conflict destroyed only capital without leading to casualties and economic disorganization. This is mainly because without further economic disorganization, casualties, and migration, the effects of physical destruction on profitability remain relatively limited. Thus, investments remain relatively resilient, and the destroyed capital is rebuilt relatively quickly. Simulations show that investments decrease by 80 percent in the baseline, where all shocks associated with the conflict are imposed, and they decrease by only 22 percent in the capital-destruction-only scenario. This mechanism highlights a remarkable difference between natural disasters and conflicts. When a natural disaster destroys built capital in a well-functioning market economy with strong institutions, the recovery of capital stock is rapid, and

impacts are not persistent. Civil wars are different: casualties, demographic movements, and lower returns to investment compound the damage to physical capital. As a result, effective losses due to physical capital damage are more pronounced, and they can linger into the future at a much higher rate than natural disasters.

Casualties impose insufferable distress and psychological impacts on families. Although their direct economic impact is comparable to that of the capital-destruction-only scenario, this impact is much more persistent. When conflict leads to casualties and no other effects (casualty-only scenario), change in GDP is comparable to that of the capital-destruction-only scenario: in both scenarios, the decrease in GDP during active conflict years remains lower than 5 percent of pre-conflict levels. Behind this similarity, however, lies a major difference between the two. Casualties are the primary drivers of outmigration: conflict-related casualties have led to a massive exodus of Syrians, whereas capital destruction has not. Simulations show that more than two-thirds of all outmigration can be attributed to casualty-related factors alone. Security-related factors dominate over economic reasons in explaining migration patterns: people move to have better life quality, but better life quality is largely about a lower probability of being killed in this case, not higher incomes. Another result from this analysis is that the economic impact of casualties is much more persistent than that of other factors. Even if the conflict ends in its sixth year, GDP continues to be significantly below its pre-conflict level: only a sixth of cumulative GDP losses within the first 20 years after the onset of conflict takes place during the six years of the conflict. The rest happens after the end of the conflict.

Disruptions in economic organization have been the most important channel through which the conflict has manifested its economic impact. Where does the bulk of economic impact stem from if not capital destruction and casualties? It stems from disruptions in how economic activity is organized. Conflict not only destroys productive factors, it also prevents the connectivity of people, reduces their incentive to pursue productive activities, and breaks economic networks and supply chains. Our simulations show that, by the end of the sixth year of the conflict, the cumulative GDP losses in the economic-disorganization-only scenario exceed those of the capital-destruction-only and casualties-only scenarios by about 20-fold each. These results suggest that even reinstating lost capital, by itself, would not be sufficient to bring the economy back to its pre-conflict level, if institutional and organizational challenges are not tackled simultaneously. Regardless of the source of financing, boosting public investments without a comprehensive approach would trigger further rent seeking and cronyism, which were important enabling factors in the conflict's onset, as described in the first section. Thus, recovery and reconstruction are by no means an engineering issue; our results show that the issue is primarily an economic and social one, where the incentives of Syrian citizens are at the core.

As the conflict continues, economic outcomes will further deteriorate and Syrians will continue to migrate. To provide an assessment of the possible recovery paths, the analysis employed different conflict end-date scenarios. These include a baseline, where the conflict ends in the sixth year, and two alternative scenarios, where the conflict ends in its 10th year or does not end in the near future. In all three cases, capital destruction, casualties, and economic disorganization shocks are employed. Accordingly, in the baseline, GDP recovers by about 20 percentage points (as a share of pre-conflict GDP) within four years after the conflict. In comparison, GDP will continue to deteriorate if the conflict does not end in the near future. In both alternative scenarios, the conflict will continue to be devastating for the country. When the conflict ends in its sixth year, the cumulative loss in GDP reaches 7.6 times the annual pre-conflict GDP by the 20th year. With a continued conflict, this loss stands at 13.2. Simulations also show that outmigration doubles between the sixth year of the conflict and the 20th year. Thus, the supply of migrants and forcibly displaced persons will not cease as long as there is conflict. The rate of deterioration slows, because the conflict is geographically limited, migration drains the labor force in conflict-affected regions, and capital stock reaches a stable level with new damage and investment ratios. As a result, the economy converges to a new equilibrium.

The longer the conflict continues, the slower the post-conflict recovery will be. Another important result from the conflict end-date scenarios is that the duration of the conflict also affects the pace of recovery. Although the rate of deterioration moderates over the course of the conflict, the effects become more persistent. When conflict ends in its sixth year (baseline), GDP recoups about 41 percent of the remaining gap with its pre-conflict level within the next four years. In comparison, it recoups only 28 percent of the gap in four years if the conflict ends in its 10th year (alternative scenario). These results do not capture much of the complications like political economy challenges, such as conflict-driven grievances. Adding these factors would only reinforce the main finding here: the more the conflict persists, the deeper will run the grievances and divisions in Syrian society, rendering it very difficult to reinstate efficient institutions and economic mechanisms.

CHAPTER *1* SYRIA BEFORE THE CONFLICT

When the Arab Spring protests took place in the Syrian Arab Republic in early 2011, few would have anticipated the forthcoming agony on a mass scale. Although it is not difficult to find "evidence" for the approaching conflict in retrospect, standard development indicators, including inequality and poverty measures, failed to predict what has become one of the most brutal conflicts of our time. Syria was following the regional trends in economic progress: extreme poverty was low; hunger and child and maternal mortality were decreasing; and school enrollment was increasing. However, there were factors that distinguished Syria from others. These included an unfavorable profile of employment and labor force participation, especially those of women; low and deteriorating indicators of governance, including lack of political pluralism and civil liberties; and high levels of perceived corruption. These characteristics have emerged historically from a complex interplay between geography and institutions, which was also manifested in a rapid centripetal momentum that accompanied the independence of the Syrian Arab Republic.

CHAPTER 1: SYRIA BEFORE THE CONFLICT

The Arab Spring protests marked the beginning of a new era in the Arab Republic of Syria. Minor public protests by the Syrian opposition began almost immediately after the initial protests in Cairo in January 2011. The first large demonstrations began two months later in March, and the following months saw a process of escalation as demonstrations spread and increased in size within the country. By the summer of 2011, the armed conflict was already unfolding. Now in its sixth year, the Syrian conflict remains active and is bringing much pain and tragedy on a daily basis.

Notwithstanding present perceptions, few would have anticipated the forthcoming cataclysm in Syria back in 2010. Syria is now deeply associated with conflict, refugees, and agony on mass scale. In retrospect, it is not difficult to find "evidence" for the approaching conflict in the previous decade. Yet, a conflict at this scale was not anticipated before its eruption. Ianchovichina, Mottaghi, and Devarajan (2015) suggest that the standard development indicators, including growth, inequality, and poverty measures, failed to predict the Arab Spring, including in Syria. The region had been making progress in eliminating extreme poverty and boosting shared prosperity; the poverty rate was declining in all economies (except the Republic of Yemen); hunger and child and maternal mortality were decreasing and school enrollment was increasing. An eyewitness to the developments in Syria reported: "...2008-2010 were years of uneasy calm, a period of superficial normality on the brink of revolution. I certainly didn't sense that a civil war would erupt in Syria in March 2011, a few months after my last visit, and I'd venture to say most Syrians did not either" (Sahner, 2014).

This chapter describes the pre-conflict conditions in Syria to understand how a seemingly stable, middle-income country like Syria experienced a brutal conflict and endured devastating impact. Although the Arab Spring marked the beginning of the events that evolved into a fully-fledged conflict, it is not enough to conclude without further analysis that "the Arab Spring caused the Syrian conflict." One reason is that the same external shock hit all Arab countries, while full-on conflicts developed only in Syria, Libya, and the Republic of Yemen.[5] The other republican governments in the region almost all faced protests and riots, but did not have conflicts develop. Similarly, the monarchies of the region experienced even less in the way of protests and no conflicts. Therefore, even if the Arab Spring triggered the conflict, there must be domestic factors that made this possible. These factors are also key to understanding the manifestation of the economic impact of the conflict.

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[5] In the Republic of Yemen, the Arab Spring did not start a civil war, but played into what was already a set of ongoing civil wars.

The Long History of Syria

The geography of Syria has played an important role in the formation of its institutions.[6] The Syrian landscape comprises immense deserts with stretches of arable land along the coastline as well as oases of major cities (map 1.1). From deserts to arable strips of land, population densities vary significantly. This landscape and corresponding demographic adjustment have worked against the establishment of a powerful centralized administration through two channels.

Map 1.1: Land Utilization in Syria
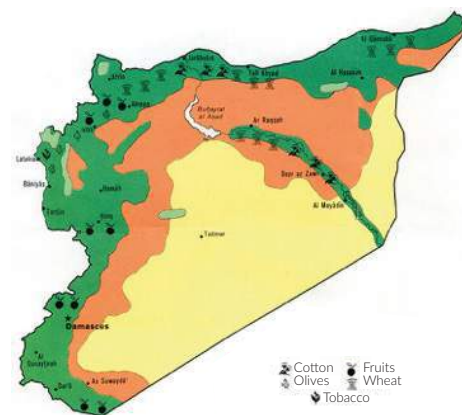
■ Cultivated land with livestock, emphasis on grains, cotton, fruits and olives
■ Forest area
■ Steppe land with nomadic herding (sheep) and scattered cultivation.
■ Desert and steppe lands with some nomadic herding

Source: Cole (2010)

Administration of this diverse geography required adaptive solutions. First, in pre-modern times, the necessity of major irrigation schemes fostered the development of centralized states. This "Oriental Despotism" or "Asiatic mode of production" was prominent in the Arab Republic of Egypt, and to a lesser extent in Mesopotamia. Syria formed an outlier among these cases. With limited prospects and returns to large irrigation projects, the capacity of centralized powers to provide public goods and services was diminished and, unlike other places in Mesopotamia, private property and use-right-based exploitation of land prevailed longer (Issawi 1995). The exercise of private property rights was further reinforced by the 19th century, as communal

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[6] The role played by geography and institutions, and their interaction, in shaping political economy outcomes has become an increasingly popular area of discussion in the economic development literature. For an interesting discussion on this, see Acemoglu and Robinson (2013), Gallup, Sachs, and Mellinger (1999), and Nunn and Puga (2012).

tenure (musha) became increasingly marginalized. Second, vast, thinly populated desert territories rendered it difficult to maintain law and order. Central authorities have often relied on a coalition of nomad and semi-nomad populations (for example, Bedouins, but also Druses, Kurds, Circassians, and others) in providing security. Historically, there was always a segment of the population potentially ready to provide such armed "protection services" as an alternative to engaging in strictly economic activities for making a living (Douwes 2000).

Alternating centripetal and centrifugal cycles are commonly observed in Syrian history (box 1.1). Occasionally the central authority lost power and the local potentates took up arms overnight and posed themselves as local "mini states," as has been the case recently with the so-called Islamic State that ruled over a vast yet thinly populated territory comprising much of Syria's uncultivable land.[7] At other times, the central authorities have time and again reasserted their rule, the last instance of which has been witnessed during the conflict. Some of the zones of influence of the various fighting forces during the conflict, especially the areas controlled by the Islamic State (also called ISIS or ISIL) and the Syrian army, are traceable to the ancient geographical and demographic fault lines.

Box 1.1: Key Historical Dates	
1516–1918	Syrian territories ruled as provinces of the Ottoman Empire
1920–1946	Syria under French Mandate
1946	Syria gains independence from France
1963	Baath Party comes to power, economic development policy characterized by state dominance and inward-looking import substitution model
1970	Hafez Assad becomes president of Syria, launches Corrective Movement that gives more space to the private sector while keeping the state's dominant role in the economy
2000	Bashar Assad becomes president of Syria
2005	Tenth Five-Year Plan signals break with Syria's state-led economic development model, move toward "Social Market Economy"
2011 January.	Regional "Arab Spring" uprisings
2011 January.	First instance of Arab Spring-inspired unrest, in Damascus souq
2011 March	Unrest begins in Daraa
2011 Spring	Unrest spreads, driven primarily by rural and peri-rural mobilization
Mid-2011- ...	Escalation of conflict

[7] Among the most important historical examples along these lines are the following. In 1857 when the Maronite peasants took up arms against their landlords in the Mount Lebanon region, the popular hero, Tanyus Shahin, acted in the name of "republican government" or "peasant commonwealth"; see Khalaf (1987). During the early period of the French Mandate, two regions became hotbeds of resistance to pacification in the countryside. One was the Alawite Mountain and the other, the northwestern districts of the Aleppo state; see Khoury (1987). Alawis revolted during the French Mandate in 1919–21, seeking their own State of the Alawis and demanding they not be placed under the State of Syria. In Jebel Druze, the Druzes revolted in 1925 to preserve their practical autonomy and resisted the French until 1927; see Hourani (1946).

The peculiar characteristics of the Syrian landscape also augmented the role of external linkages. Before its independence, the geographical Syria historically often resided as a province of large empires. This meant that it received international "protection"—provided at little or no cost—by larger powers, most notably the Ottoman Empire (map 1.2). This special relationship involved "political and economic exchanges" between the empires and geographical Syria. For instance, the Ottoman Empire provided protection at home as much as it could, and protection from foreign interference, from the early 16th century to the early 20th century, except for a brief intervention in 1860 when French forces intervened in response to the civil war. Geographical Syria also benefitted economically from being integrated into imperial-scale economic networks, which paid off handsomely, albeit unevenly, as will be discussed below.

Map 1.2: The Ottoman Administration of Geographical Syria
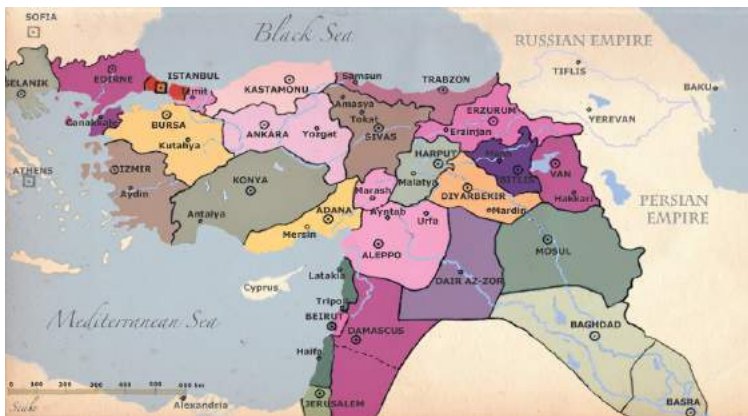
Source: Sullivan (2013).

Syria's access to long-distance trade networks under the protection of large empires shaped its economic and political topography. Geographical Syria comprised two major centers of economic activity: Aleppo and Damascus. During Ottoman Rule, the Eyalet (province) of Aleppo and the Eyalet of Damascus played vital roles in connecting trade routes, the organization and provisioning of periodic caravans, and the regular extension of credit, as well as protection to the merchants and their merchandise. Aleppo was historically integrated more into the Anatolian networks of trade, while Damascus looked in the opposite direction, south. Aleppo was the third largest city (after Istanbul and Cairo) of the Ottoman Empire in the 17th and 18th centuries, as well as "the leading commercial and handicraft center of southwest Asia" (Issawi 1988, 4). Thanks to its easy access to the Mediterranean via Alexandretta, it was the major entrepôt for European goods just as it exported

its famous manufactures (map 1.3). In the early 19th century, each year four caravans left Aleppo for Iraq and Anatolia and two for Persia and Iraq. On average, a caravan consisted of about 1,500 camels. It took 25–30 days to cross the desert directly between Aleppo and Bagdad, and 45 days via Diyarbakır (Owen 1981, 53–54). Damascus was also well connected in general and, to its benefit, it served as the historic point of departure for the annual Hajj caravan. Two or three caravans a year traversed the desert between Damascus and Bagdad in the late 18th century. Yet, Damascus lacked easy, quick, and safe access to the coastline, which only came with the construction of the Beirut-Damascus road (1863) and ultimately the railway (1895). Before then, the dangerous trip of only 70–80 miles from Damascus to Saida or Beirut cost more than crossing the entire Syrian Desert as late as 1848 (Owen 1981, 54). This made Aleppo the preferred location for foreign merchants who could maintain relatively easy ties with Europe via Alexandretta.

Map 1.3: Caravan Routes, 16th to 20th Centuries

Source: Owen 1981

The establishment of nation states in the region shook the foundations of the traditional Syrian economy. Broken trade networks and newly introduced trade frictions at the borders posed significant costs on Syria. After the secession of Beirut and Alexandretta from the historical greater Syria, Aleppo and Damascus lost their strategic and commercial access to the Mediterranean, which has only been partly compensated by the costly development of the lesser Port of Latakia. The merchants of Aleppo, who were dependent on long-distance trade, were cut off from their historical connections. So were the merchants of Damascus; however, their losses could be compensated by expanding the service sector in the new nation's capital.

The truncation of Syria from its economic networks boosted the centralization momentum that came with independence. After independence, the Syrian government launched a path of agriculture-based, increasingly import-substituting industrial and economic development strategy. This required strong "vertical" connections between the foundational agriculture and to-be-developed industrial and service sectors. However, Syria's land was much exhausted by hundreds of years of hard use, climatic change, and scarce water resources. Hence developing agriculture was a challenge in which Syria had scant comparative advantage. Even so, the Baath government pushed agriculture to the limits of the possible. By doing so, the central government instituted itself in the allocation of resources, in particular via land redistribution and access to irrigation.

The reinforcement of a centralized state came with complications. The new government in Damascus faced complex challenges in promoting a cohesive nation state. The policies of empires tolerated, if not emphasized, sectarian and ethnic differences. For instance, under the French administration, minorities were afforded autonomy and rights vis-a-vis neighboring ethnicities, and regional and communal representation was established in the Parliament. Centralization meant the complete absorption of certain groups, like the Alawites, into the young state apparatus and the exclusion of others, like the Kurds. Alawites became reconciled to common Syrian citizenship, and gave up the dream of a separate Alawite state. Kurds faced a harsh transition. With the 1962 census, nearly 120,000 Kurds, 20 percent of the resident Kurdish population, found themselves "stateless" overnight in the Jazira province (HRW 1996). Other harsh measures included the implementation of an "Arab Cordon" on the lands that bordered Turkey. Kurds were expelled, and Arab Bedouins were brought in to resettle the area. As the cordon ended, some 140,000 Kurds had been relocated to the southern desert of Al-Raad (Vanly 1992).

By the new millennium, Syria was ruled by a well-established, authoritarian, and seemingly stable central administration. Since 1970, the last successful coup, which brought Hafez al-Assad to power, presidential elections have never been contested and the single candidate (Hafez al-Assad, then his son Bashar) has never won less than 99 percent of the vote. The executive and

Baath Party have dominated all three branches of government (parliaments have been handpicked by the Baath Party and the president). In the economic and social spheres, the government was considered as inclusive with a broad popular base (Batatu 1999). The government distributed relatively generous rewards, especially to those who took the extra step to join the ranks of the Baath Party.

Syria at the Dawn of the Conflict

The decade before the conflict witnessed a transition from four decades of socialism toward a "social market-economy." In 2001, Syria requested to become a member of the World Trade Organization and, in 2007, a free trade agreement with Turkey came into effect. In 2004, the government permitted private banks to operate in Syria for the first time after more than 40 years, and in 2009, it opened the stock market. This trend accelerated from 2005, when Syria embraced "Social Market Development" in its Tenth Five-Year Plan. In the period that led up to 2011, Syria undertook several market-friendly reforms. The Syrian government focused in particular on improvements to the business environment and took measures to reduce tariffs, lower the top income tax rate, and unify the exchange rate. The decline in oil production in many ways served as the motivation for these reforms.

On the eve of the 2011 unrest, Syria was a fast-growing, lower-middle-income country. In aggregate terms, the Syrian economy was improving, albeit starting from an unfavorable base, during the 2000s. Gross domestic product (GDP) grew at an average of 4.3 percent per year from 2000 to 2010 in real terms, which was almost entirely driven by growth in the non-oil sectors, and inflation averaged a reasonable 4.9 percent. The current account was largely in balance and, by the end of 2010, Syria was estimated to have international reserves to cover more than nine months of imports. Despite the improvements, however, Syria's GDP per capita in 2010 (at current prices, US$2,949) was significantly lower than those of its neighbors (Iraq: US$4,521, Lebanon: US$8,846, and Israel US$31,665).

The opening of Syria was also reflected in its booming international trade. The value of Syrian trade with the rest of the world reached 76.5 percent of GDP just before the global financial crisis, which was relatively high compared with the average for the Middle East and North Africa (MENA) (excluding oil-exporting high-income countries) of 70.3 percent of GDP. Tariffs in Syria were slightly high by regional standards, with a weighted mean rate of 7.2 percent in 2010, compared with 6.1 percent for MENA (excluding high-income countries). However, there was relatively little foreign direct investment through this period. Foreign investment represented 1.3 percent of GDP on average during this period and focused mainly on pharmaceuticals, food processing, and textiles. Therefore, the impact of the global financial crisis on Syrian GDP was relatively moderate, and it was primarily transmitted by changes in the major export markets of Syrian producers, mainly the European Union and Gulf economies.

Despite the increasing momentum, however, the Syrian economy exhibited several risk factors that may have contributed to the onset and escalation of the conflict. The conventional risk factors that are associated with armed conflict include absolute (objective) and relative (subjective) levels of socioeconomic deprivation, ethnic/sectarian fragmentation, and unfavorable governance indicators, including corruption and low institutional capacity.[8] In what follows, the analysis will describe a several areas where improvements in aggregate economic conditions failed to mitigate these potential risk factors in Syria.

Employment

Growth and market-oriented reforms created more jobs; however, those fell short of keeping up with the demographic dynamics. The high economic growth rate and increasing liberalization efforts led to an expansion of employment at a rate of 1.3 percent annually, on average, in the decade prior to the conflict. The growth of the population (2.9 percent annually) and labor force (1.7 percent annually) dwarfed the growth in employment. Agriculture experienced a contraction in employment in the same period. The sector's share of employment fell from 32.9 percent in 2000 to just 13.2 percent by 2011, in part because of the droughts that struck the country from 2006 to 2011, which contributed to a major demographic shift from rural areas to urban centers, increasing the shares of employment in services and industry to 55.3 and 31.4 percent, respectively. It has been argued that the 2006–09 drought and concomitant migration to cities was a major risk factor that contributed to the events in 2011; however, it is difficult to verify this empirically.

The excess labor, especially women, were pushed out of the labor force. With labor markets failing to absorb the growing size of the labor force, from 2001 to 2010, the aggregate labor force participation rate decreased by about 7 percentage points (from 50.2 to 43.5 percent). The adjustment was more severe for women: their labor force participation (LFP) rate decreased by more than 10 percentage points (from 20.4 to 13.2 percent). By 2010, Syria had one of the lowest LFPs in the world, low even by regional standards (Egypt and Tunisia had 49 and 47 percent LPF rates, respectively). The gap was primarily driven by the extremely low, and decreasing, participation of women in the economy. Female LFP in Syria was about 5 percentage points lower than the MENA average (excluding high-income countries) and 10 percentage points lower than Egypt and Tunisia. Similarly, the unemployment rate among women (25.2 percent), more than four times higher than that of men (6.1 percent), was the highest in MENA (figures 1.1 and 1.2).

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[8] See Fearon and Laitin (2003) for a detailed discussion on this.

Figure 1.1: Labor Force Participation Rate, 2010

TUN — 24%	EGY — 76%
EGY — 23%	TUN — 70%
JOR — 15%	SYR — 69%
SYR — 14%	JOR — 68%
MNA — 19%	MNA — 72%
LMC — 38%	LMC — 79%

Left axis: 0% 10% 20% 30% 40% 50%   Right axis: 60% 65% 70% 75% 80% 85%
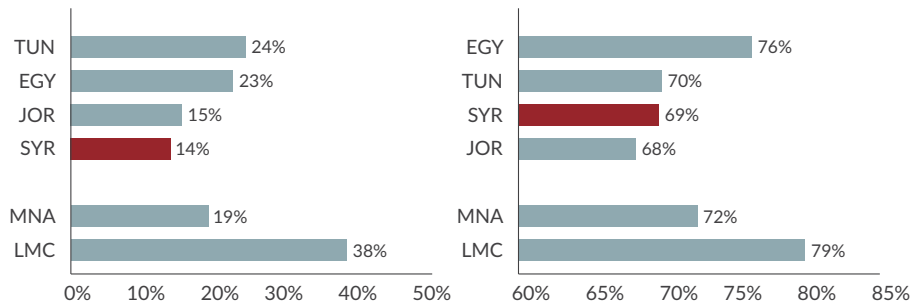
Source: World Development Indicators; Syria Central Bureau of Statistics.

Note: The MNA average excludes high-income countries. EGY = Egypt; JOR = Jordan;
LMC = lower-middle-income countries; MNA = Middle East and North Africa;
SYR = Syrian Arab Republic; TUN = Tunisia.

Figure 1.2: Structure of the Working-Age Population in Syria, 2010

Working age population
13million 63%

Inactive
7.2million 55.4%

Active
5.8million 44.6%

Employed
5.3million 91.4%

Unemployed
0.5million 8.6%

Men
0.3million 61%

Women
0.2million 39%

Wage-employed
3.3million 63.2%

Self-employed
1.5million 28.8%

Employer
0.2million 4.2%

Unpaid worker
0.2million 3.8%

Private sector
1.9million 57%

Public sector
1.4million 43%
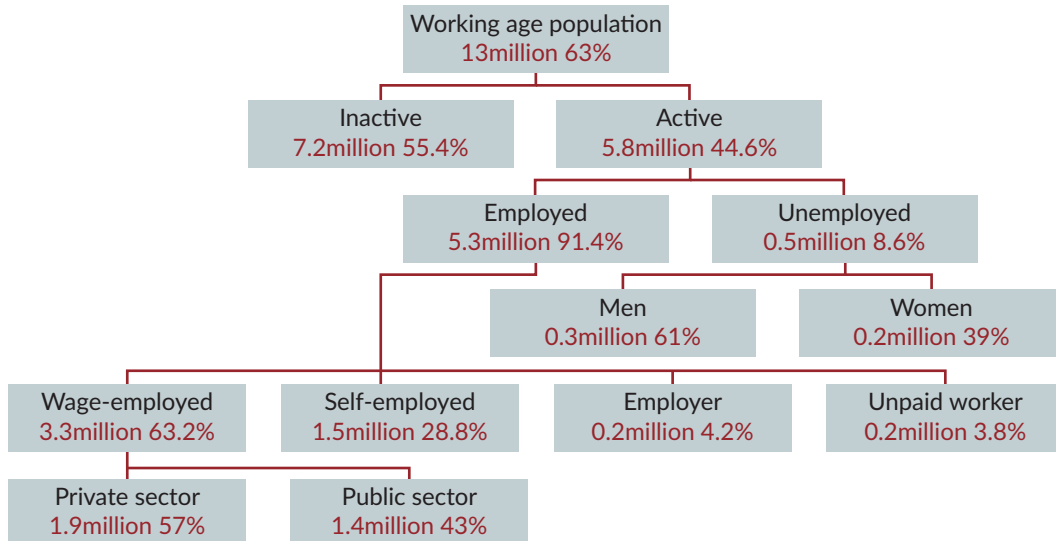
Source: Central Bureau of Statistics Labor Force Survey 2010.

Poverty and Inequality

During the 2000s, poverty rates registered small increases, but overall remained within regional norms. Table 1.1 summarizes poverty measurements and Gini index over the three periods of surveys covered in UNDP (2005) and UNDP (2011). In 1996–97, the national extreme poverty rate was 14.3 percent and the overall poverty rate was 33.2 percent, with a Gini coefficient of 33.7. In 2003–04, the extreme poverty and overall poverty rates had declined to 11.4 and 30.1 percent, respectively, while the Gini index increased to 37.4. Thus, growth was not pro-poor, as the expenditure distribution became more unequal, but it was more than offset by increased per capita expenditure. In 2006–07, the poverty rates rose slightly (12.3 percent extreme poverty and 33.6 percent overall poverty), reversing the gains between 1997 and 2004, whereas inequality fell to a Gini index of 32.6. According to UNDP (2014), multidimensional poverty in Syria (5.5%) stood above those in Tunisia (1.2 percent) and Jordan (2.4 percent), but below that of Egypt (6.0 percent) in 2010. The inequality measure in Syria was well within the range observed in other countries during the 2000s; the Gini index varied from 41 percent in Tunisia in 2000 to 31 percent in Egypt in 2008.

Table 1.1: Incidence of the Abject, Extreme, and Overall Poverty Rates and the Gini Coefficient, 1997–2007

	Abject poverty rate (%)	Extreme poverty rate (%)	Overall poverty rate (%)	Gini coefficient
1997		14.3	33.2	33.7
2004	2.2	11.4	30.1	37.4
2007	1.2	12.3	33.6	32.6

Source: UNDP 2011.

Note: The estimates reflect UNDP's cost-of-basic-needs methodology-based poverty assessments. Abject poverty defines the share of population whose expenditure lies below the food poverty line. Extreme poverty defines the share of population whose per capita expenditure is less than the cost of food plus expenditure on absolute-minimum essential nonfood goods. Overall poverty defines the share of population whose per capita expenditure is less than the cost of food and a reasonable minimum expenditure on nonfood items. UNDP = United Nations Development Programme.

Poverty in Syria has been concentrated in the northeast region, especially in rural areas. Rural areas in Syria have consistently been poorer than urban centers, and the urban-rural divide has grown since 1997 (table 1.2). The poorest part of the country in 2007 was the rural northeast, with a headcount ratio of 19.7 percent, seven percentage points higher than the next area (12.8 percent in rural areas of the southern region). While 44 percent of the total population lived in the northeast, it accounted for 56 percent of the extreme poor. The rural northeast was also the only area that experienced an increase in

poverty between 1997 and 2004. The least poor area in 2007 was the coastal region, with an extreme poverty rate of 7.7 percent. The southern and central regions enjoyed a huge drop in the poverty rate between 1997 and 2004, which drove poverty reduction for overall Syria in 2003–04. Comparing the urban-rural discrepancies in the headcount ratio in Syria with those in comparator countries, the differences were not particularly pronounced in Syria. In 2007, the difference in urban versus rural poverty rate was 6 percentage points. This was higher than the spatial inequity in Jordan, but far more moderate than the situation in Egypt in 2010, where the headcount ratio in rural areas was 17 percentage points higher than in urban areas (32 versus 15 percent).

Table 1.2: Incidence of Extreme Poverty, by Region, 1997, 2004, and 2007

		1997	2004	2007
Southern region	Urban	10.69	5.82	10.6
	Rural	15.19	10.67	12.8
	Total			11.2
North-East region	Urban	13.94	11.16	10.8
	Rural	15.24	17.91	19.7
	Total			15.4
Central region	Urban	14.80	9.02	7.76
	Rural	22.58	11.10	9.05
	Total			8.4
Coastal region	Urban	11.34	9.34	5.6
	Rural	9.52	9.70	9.09
	Total			7.7
Syria	Urban	12.6	8.7	9.9
	Rural	15.9	14.2	15.1
	Total	14.3	11.4	12.3

Source: UNDP 2011.

Note: For ease of exposition, the table focuses on the extreme poverty rate for the discussion of regional differences. The interpretations are qualitatively the same for the overall poverty rate. Regions comprise the following governorates: South – Damascus, Rural Damascus, Deraa, El Suaida, and El Quneitra; Northeast – Idleb, Aleppo, Al Raqqa, Deir Ezzor, and Hassakeh; Central – Homs and Hama; Coastal – Tartous and Latakia.

Several external factors reinforced the deterioration of poverty in the south-ern and northeast regions. Syria and the greater Fertile Crescent region experi-enced moderate-to-severe drought from 1998 to 2009, with the winter of 2007/08 being the driest since records were kept starting in 1931 (Kelley et al. 2015). This caused large-scale failure of crops and livestock deaths, displacing as many as 1.5 million people from rural farming communities to urban areas in the south, in search of alternative jobs and livelihoods. This displacement coincided with the arrival of 1.2 million to 1.5 million Iraqi refugees between 2003 and 2007, who settled primarily in the urban regions in the south. The large inflow of internal migrants and Iraqi refugees could depress wages in the urban south, especially in the informal sector, where many of the displaced would be employed or seek work, and drought-driven increases in food prices could further depress the real incomes of the poor (UNDP 2011).

Governance

Unlike the economic dimensions discussed so far, Syria consistently ranked low in ratings on basic indicators of governance, including institutional checks and balances and political pluralism (figure 1.3). In governance indicators, the country hovered at the bottom of the scale or saw a visible deterioration during the 2000s. Similarly, the country scored substantially below Organisation for Economic Co-operation and Development (OECD) and middle-income MENA comparators, including Egypt, Jordan, and Tunisia.[9] These rankings reflect the closed nature of Syria's governance system and considerable concentration of power in the executive, even by regional standards. The country also performed poorly on administrative and policy implementation functions in absolute terms and relative to other middle-income MENA states and the OECD, although after 2008 its absolute rating showed signs of modest improvement. Studies from that period reveal that the quality of regulatory functions and services to citizens and businesses were low and stagnant (International Crisis Group 2009). The government's Mid-Term Evaluation Report of the Tenth Five-Year Plan documented poor implementation of planned institutional reforms and insufficient progress on administrative reform measures (Syrian Center for Policy Research 2013).

The lack of civil liberties and freedom was more prominent in Syria than in the other Arab Spring countries, based on low ratings on several governance and institutional indicators. Syria's ratings on measures of freedom of association and assembly, and freedom of expression and belief, are low not only relative to young OECD members (for example, Estonia), but also relative to other MENA comparators. Relevant global indicators suggest that, during the 2000s, Syria's coercive capacity was in line with that of other MENA

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[9] The Bertelsmann Transformation Index data (note shown) suggest that Syria also significantly underperformed on freedom of association relative to comparators. This is supported by many scholarly accounts from the pre-2011 period, documenting Syria's extremely constrained spaces for independent civil society (Hinnebusch 1995; Baroutt 2011).

comparators, which is particularly noteworthy, given Syria's geographic proximity to countries that were experiencing or recently emerging from violent conflict (for example, West Bank and Gaza, Lebanon, and Iraq).

Another important feature of Syria's governance landscape prior to 2011 was the country's high levels of perceived corruption. According to global indexes, Syria's rankings on control of corruption and control of economic monopolies sharply declined after 2005. Although the country had already trailed MENA middle-income peers on both fronts in 2005, the gap widened substantially by 2010. These trends also undermined citizen trust in public institutions. Gallup surveys from 2009–10 show that the percentage of Syrians expressing trust in key public institutions, such as local police and the judicial system, was lower than comparators. For instance, in 2010, only 48 percent of Syrians reported trust in local police; in comparison, about 87 percent of Jordanians responded favorably.[10]

Overall, the inability to match the aggregate economic developments with further economic and political inclusion, transparency, and civil liberties constituted major risk factors. The analysis so far has shown that the strong growth performance in the decade before the conflict was not accompanied by an equally strong performance in several areas. Although Syria did not compare unfavorably with other regional economies in many areas, including aggregate inequality and rural-urban disparity of poverty, in certain areas it did. These included deterioration in labor market conditions, especially for women. These various factors, in turn, constituted enabling conditions for the onset of the conflict before the Arab Spring events kindled the fire.[11]

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[10] In Syria, the Gallup survey did not field questions on trust in the executive or government more generally. Data limitations inhibited a comprehensive comparison of Syria with MENA peers other than Tunisia.

[11] The main causes of the onset of the conflict in 2011 should be separated from the main drivers of its duration and intensity. Whereas the former is largely determined by domestic factors and the Arab Spring effect, the latter are purely determined by the characteristics of the Syrian political economy. For an analysis on this, see Fearon (2017); for a broader assessment of the socioeconomic drivers of the Arab Spring, see Ghanem (2016).

Figure 1.3: Governance Indicators in Syria

SEPARATION OF POWERS
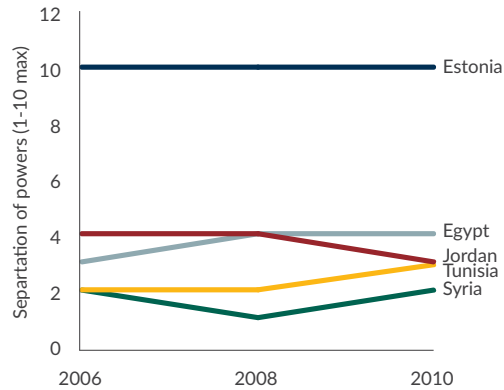
Source: Bertelsmann Transformation Index

POLITICAL PLURALISM & PARTICIPATION
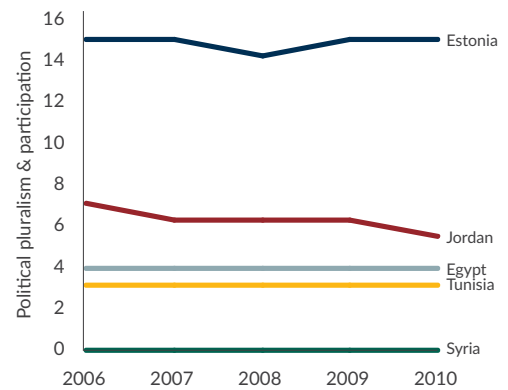
Source: Freedom in the World, Freedom House

FREEDOM OF ASSOCIATION & ASSEMBLY
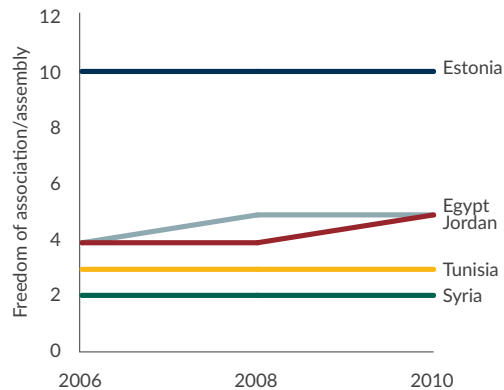
Source: Bertelsmann Transformation Index

FREEDOM OF EXPRESSION & BELIEF
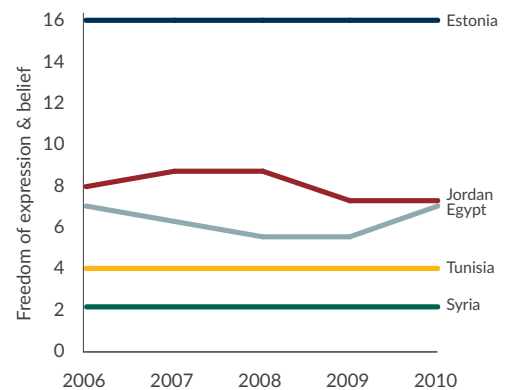
Source: Freedom in the World, Freedom House

CONTROL OF CORRUPTION (PERCENTILE RANK)
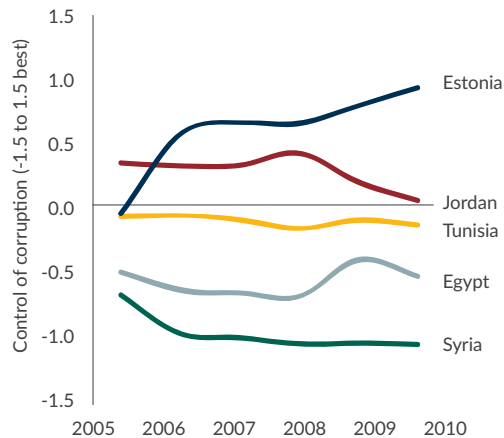
Source: World Governance Indicators

CONTROL OF MONOPOLIES
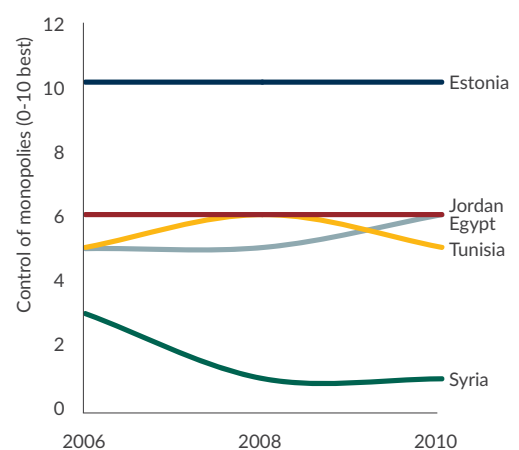
Source: Bertelsmann Transformation Index

CHAPTER *2*   **THE WRATH OF CONFLICT**

The conflict has inflicted significant costs in terms of physical damage, loss of lives, and demographic dispersion, as well as worsening economic and human development outcomes in Syria. Across the 10 cities studied in this report, 27 percent of the housing stock has been destroyed or partially damaged. The effects on human lives and displacement have been even more dramatic. Conflict-related deaths are estimated between 312,000 and 470,000. Many more are estimated to have died as a result of the indirect effects of the conflict, including reduced access to health care, medicine, and nutrition, and over half of the country's pre-conflict population has now been forcibly displaced. Overall, Syria's 2016 GDP was estimated at only about a third of its 2010 value, and today two of every three Syrians live in extreme poverty. As the conflict remains active, these outcomes deteriorate further on a daily basis.

CHAPTER 2: THE WRATH OF CONFLICT

Once triggered, the conflict quickly escalated to affect Syrians' lives in extensive and devastating ways. Conflicts destroy tangible and intangible assets, and leave deep marks on a country's culture and the minds of its people. Syria exemplifies this. What began as peaceful protests in 2011 escalated into a full-scale armed conflict among many parties. The conflict has drawn in other countries in a direct or indirect manner, and it has led to spillovers in neighboring countries and destinations in Europe.

The intensity and impact of the conflict have not been the same everywhere in Syria. Although the ongoing conflict has affected the entire Syrian landscape and demography one way or another, it has taken different forms of varying magnitude across the country's vastly heterogeneous geography. Map 2.1 shows the variation in exposure to conflict in different areas. A large portion of Syria has experienced extensive low-intensity conflict (defined as more than 70 percent of populated areas within the district experiencing low-intensity conflict). The particularly destructive forms of conflict, artillery shelling and airstrikes, have not been equally distributed. Raqqa, for instance, has been mostly exposed to extensive airstrikes (defined as more than 2,000 strikes from 2011 to 2017), but it has not experienced heavy artillery shelling or extensive low-intensity conflict. Aleppo (city and district) has experienced the highest level of conflict incidence in all categories.

This chapter takes stock, in a nonexhaustive way, of outcomes associated with the conflict. It was not possible for this study to capture all the consequences of the conflict in a comprehensive manner. Some of those, including the political, social, security-related, and institutional effects, are not quantifiable. The bulk of these effects will be manifested in the future, or extend into the future. In the absence of better tools to capture those, the analysis in this chapter focuses on effects that are observed quantitatively, and supports them with qualitative observations. More specifically, we discuss the effects of the conflict by using the following classification: (i) physical damage, (ii) loss of lives and demographic dispersion, and (iii) economic and human development outcomes. The findings of this chapter will then be used in chapter 3, where the analysis will turn to assessing the overall economic impacts of the conflict.

Physical Damage

The conflict has inflicted extensive damages on Syria's physical infrastructure. Cities like Homs, Aleppo, and Damascus, and many smaller towns, have served as battlegrounds for government and rebel offensives, with tragic humanitarian consequences for their inhabitants. Over time, the conflict has caused the breakdown of partial or entire urban systems in many cities, by destroying houses and public service–related infrastructure, like roads, schools, and hospitals, leading to the collapse of economic activities in many areas. As bridges, water resources, grain silos, and other economically significant assets became strategic targets, the bill due to physical damage increased.

Map 2.1: Incidence of Conflict, 2011–17

LOW INTENSITY CONFLICT
By District (ADM2) Relative Prevalence

- Extensive
- Moderate
- Limited to none

HEAVY ARTILLERY SHELLING IN EACH GOVERNORATE
By District (ADM2) Relative Intensity

- Extensive
- Moderate
- Limited to none

AIRSTRIKES IN EACH GOVERNORATE
By District (ADM2) Relative Intensity

■ Extensive (Recent)
■ Extensive
■ Moderate
□ Limited to none
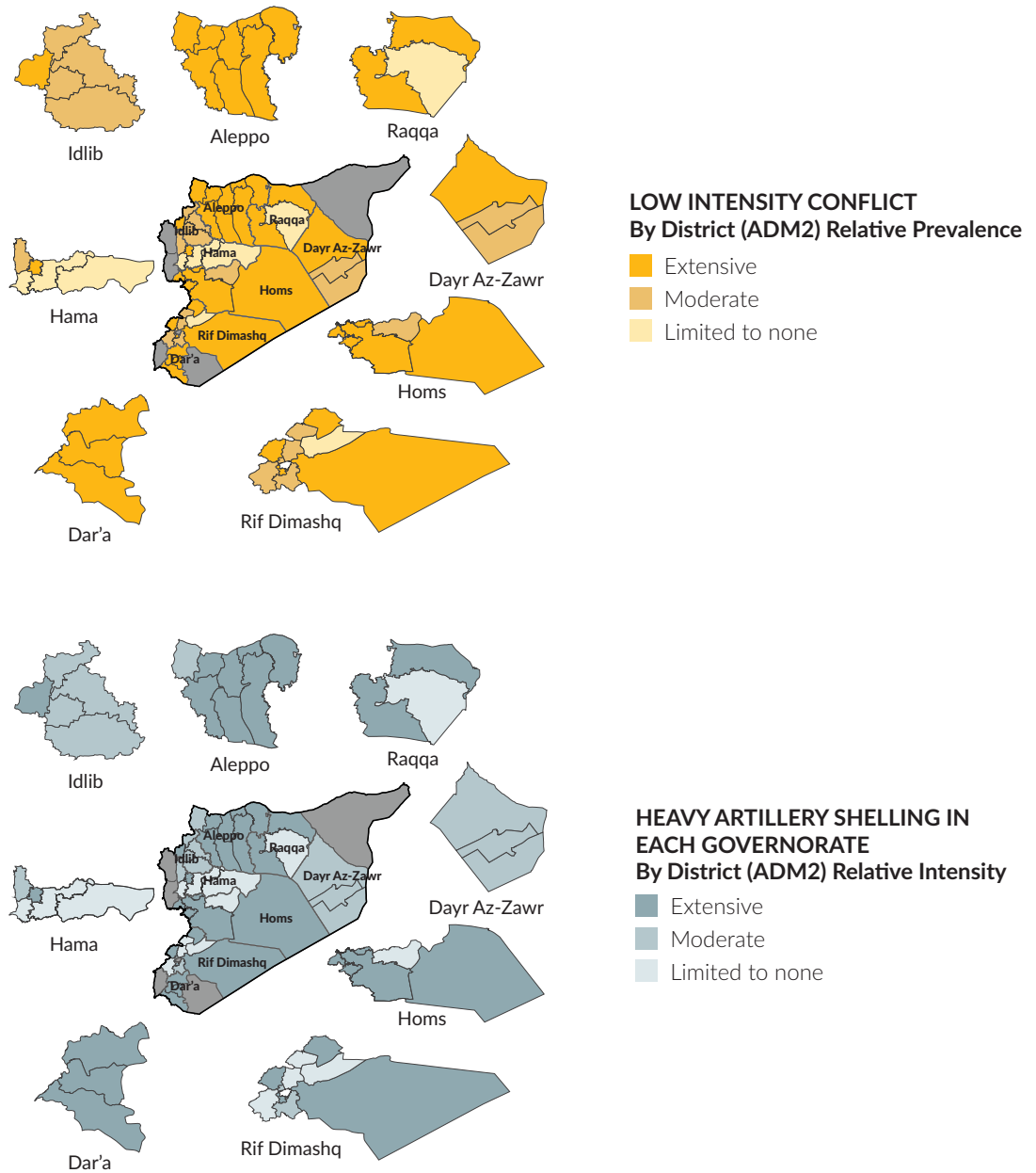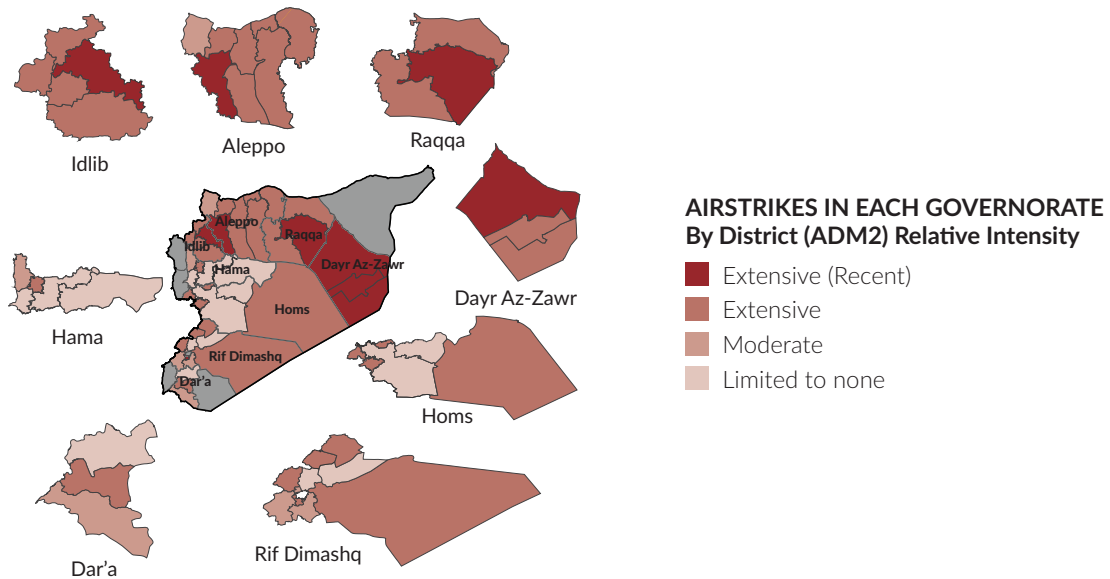
Source: World Bank staff calculations.

This section assesses the degree of physical damage by using remote-sensing techniques in conjunction with other available information. In the absence of comprehensive access to on-the-ground information, the analysis relies on remote-sensing-based calculations, which are then cross verified by using various public information channels, including local news and other media outlets and social media analytics (for still or motion pictures of destruction). The analysis relies on three components:

- *City-level assessments*. These provide damage estimates as of January 2017 for 10 cities, including Aleppo, Dayr az-Zawr, Raqqa, Dar'a, Idlib, Douma, Kobane, Tadmur (Palmyra), Homs, and Hama. The specific sectors of focus for each city are the following: housing, water and sanitation (WASH-public network), energy (public network), health (public facilities), education (public and facilities), and transportation (primary road network).

- *Governorate-level assessments*. These extrapolate the findings to provide damage analysis for the country's eight most conflict-affected governorates: Aleppo, Homs, Hama, Dayr az-Zawr, Raqqa, Dar'a, Idlib, and Rif Dimashq. The extrapolation relies on city-level damage; however, it utilizes additional information like intensity and composition of conflict in cities and corresponding governorates, as well as the baseline differences between initial stocks of infrastructure.

- *Targeted assessments*. These provide assessments in a narrow category that may not be comprehensive as a result of data limitations, for example, damage in industrial zones, steel and cement factories, and a pilot assessment of environmental damage in the cities of Aleppo and Hama, with a special focus on conflict-driven debris.

Housing

Syria is a highly urbanized country. Prior to the conflict, Syria was rapidly urbanizing, with 56 percent of the population living in urban areas, most of which are in rain-fed agricultural regions, including the basin of the Euphrates River, or along interior trade routes. The two largest cities, Damascus and Aleppo, accounted for nearly 37 percent of the urban population and 20 percent of the total population. According to the 2010 Syrian census data, there were 4,128,941 conventional dwelling units across Syria's 14 governorates. Residential housing stock in the eight examined governorates in the same year amounted to 2,881,392 housing units distributed among different housing typologies (Syria Central Bureau of Statistics).

The conflict further intensified the rural-urban migration. Starting from the mid-to-late 1990s, Syria experienced rural-to-urban migration spurred by drought and environmental degradation. Around 40,000 to 60,000 families migrated from rural to urban areas each year because of droughts. The conflict provided a major boost to migration. Today, around 72.6 percent of thE population (13.7 million people) is living in urban areas in Syria, and these urban areas have undergone dramatic demographic change. Those directly impacted by the conflict, like Homs and eastern Aleppo, have been experiencing an exodus of residents that have fled violence, destruction, and the collapse of basic services. Other areas, promising relative security and consistency of services, have experienced large influxes, with the net result being a significant concentration of the population (internally displaced persons (IDPs) and hosts) in urban areas.

Table 2.1: Housing Damage in Cities

City	Units in 2010	Damaged units in 2017		Damaged units in 2017 (% of 2010 value)	
		Partial damage	Destroyed	Partial damage	Destroyed
Aleppo	662,323	154,465	49,830	23.3	7.5
Raqqa	55,746	7,214	2,418	12.9	4.3
Dar'a	30,532	3,678	922	12.0	3.0
Douma	18,786	3,476	884	18.5	4.7
Dayr az-Zawr	48,430	15,107	4,849	31.2	10.0
Homs	216,191	37,350	12,526	17.3	5.8
Hama	101,902	2,531	3,020	2.5	3.0
Idlib	46,014	1,164	2,916	25.3	6.3
Tadmur	3,178	1,042	272	32.8	8.6
Kobani	20,801	2,226	814	10.7	3.9
Total	1,181,813	238,311	78,339	19.8	6.5

Source: World Bank staff calculations.

In conflict-affected cities, physical destruction has been extensive. The conflict in Syria has severely impacted the housing sector, where a huge number of residential units have been partially damaged or fully destroyed, housing investment disrupted, quality of living space deteriorated, and land and property rights severely challenged. At the city level, an estimated total of 316,649 housing units were exposed to impact, with Aleppo bearing the largest share at 64 percent of the impacted urban housing, followed by Homs at 16 percent. The damage across the examined cities constitutes an estimated 78,339 residential units destroyed and 238,311 units partially damaged (table 2.1). Across the 10 cities, 27 percent of the housing stock has been impacted, with 7 percent destroyed and 20 percent partially damaged. The percentage vary across cities, with destroyed building percentage ranging between 3 and 10 percent of the baseline housing stock, while the percentage of partially damaged units ranges from 2.5 to 33. Similarly, damage varies across neighborhoods within cities as well (maps 2.2 and 2.3).

Governorate-level assessments provide a broader sense of the damages in the housing sector across Syria. The damage across the eight governorates translates into an estimated 220,826 residential units destroyed and 649,449 partially damaged.[12] In total, about 32 percent of the housing stock in the eight governorates has been impacted, with 9 percent destroyed and 23 percent partially damaged (table 2.2). The percentages vary among governorates, with the percentage of destroyed units ranging between 3 and 10 percent of the baseline housing stock, while the percentage of partially damaged units ranges from 3 to 31 percent.

Map 2.2: Neighborhood-Level Housing Damage

Aleppo

Dar'a

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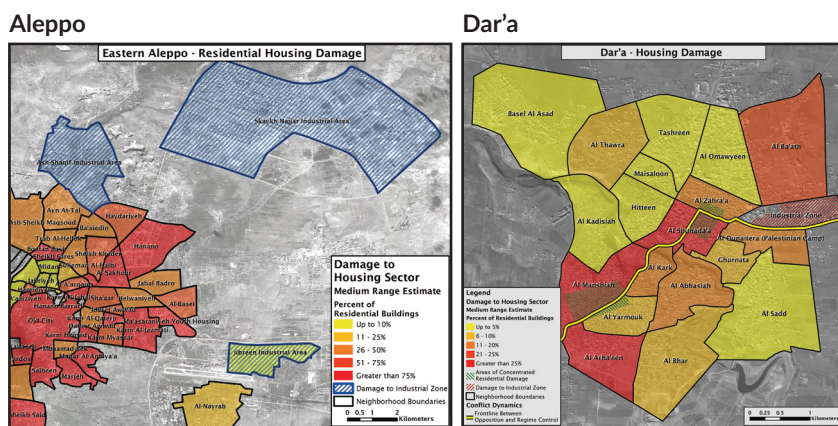
[12] The physical status of each unit was classified in three categories: destroyed (> 40 percent damage), partially damaged (< 40 percent damage), and no damage.

Dayr Az Zawr
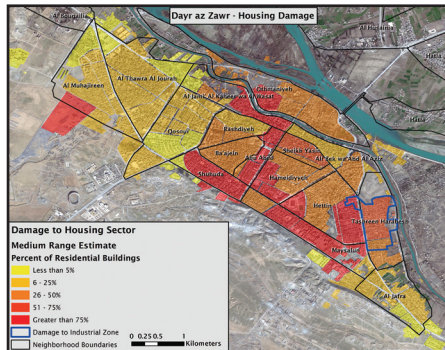
Douma
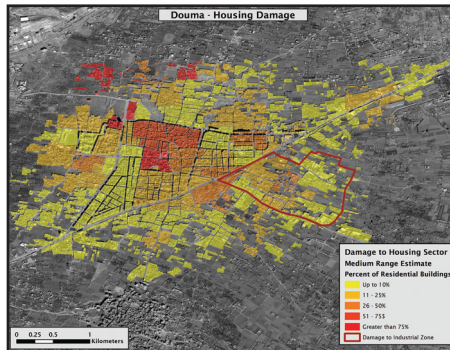
Hama
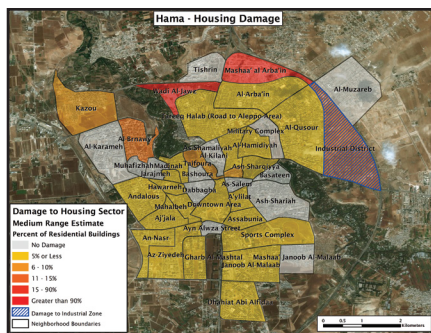
Homs

Idlib

Kobani

Raqqa
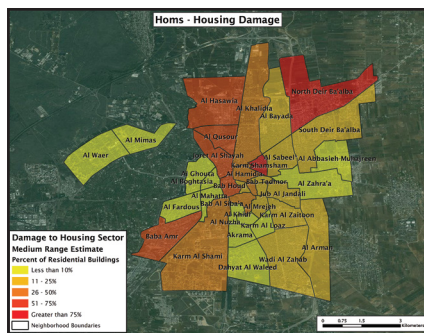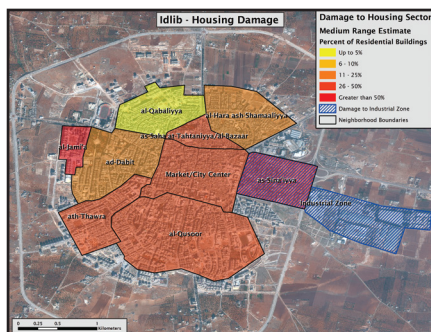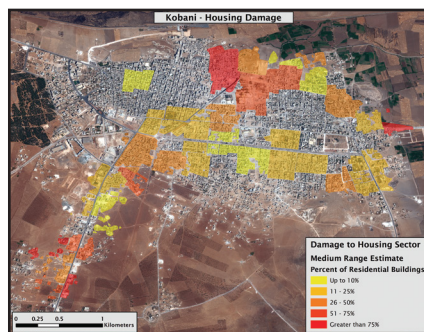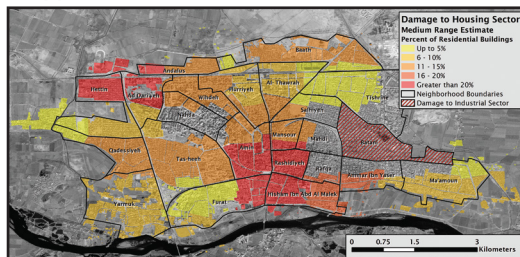
Tadmur
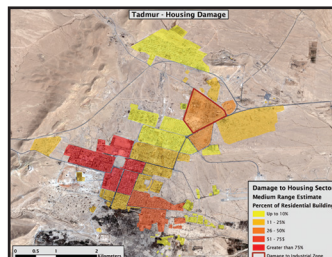
Source: World Bank staff calculations.

Map 2.3: Governorate-Level Estimates of Housing Damage

ESTIMATED DAMAGE TO SYRIA'S HOUSING SECTOR (within the 8 surveyed governorates)

22% of all housing partially damaged
8% of all housing destroyed

Estimated number of damaged housing units

- 3,679-7,057
- 7,058-12,281
- 12,282-17,240
- 17,241-30,749
- 30,750-184,847

Governorates not included in coverage
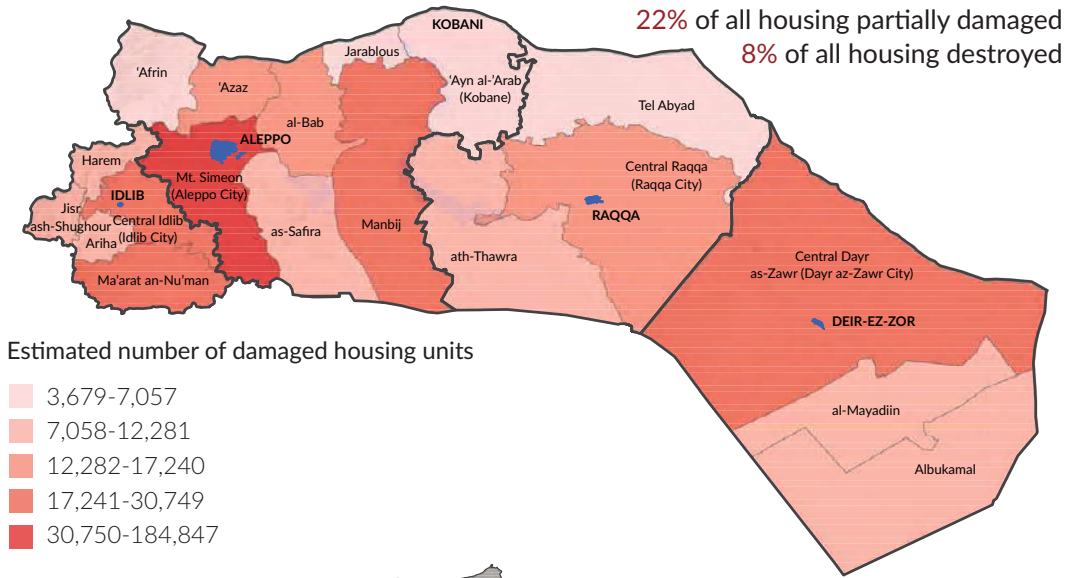
Governorate	Est. apt. units	Est. other types
Aleppo	319,209	461,750
Idlib	46,396	182,922
Day az-Zawr	28,128	122,537
Raqqa	12,669	114,911

IDLIB: 5.67%, 1.62%, 22.33, 6.38%, 64%

ALEPPO: 11.36%, 3.25%, 15.27, 4.47%, 65.65%

RAQQA: 1.56%, 0.55%, 5.57%, 17.05, 75.27%

DAYR AZ-ZAWR: 5.23%, 1.49%, 22.77, 6.51%, 64%

- Partially damaged apartment units
- Destroyed apartment units
- Partially damaged other types
- Destroyed other types
- No damage to housing

Estimated number of damaged housing uits

	2,007-4,895
	4,896-10,805
	10,806-21,255
	21,256-38,399
	39,400-78,984

as-Suqaylabiyya
Mhardeh
Central Hama
(Hama City)
Masyaf
as-Salmiyya
HAMA
ar-Rastan
al-Makhrem
Telkalakh
HOMS
al-Qusayr
TADMUR
Tadmur
(Palmyra)
Central Homs
(Homs City)
an-Nabk
Yabroud
al-Qutayfa
az-Zabadani
at-Tal
• **DOUMA**
Darayya
Qatana
Central Rif Dimashq
Douma
as-Sanamayn
Izra'
DAR'A Central Dar'a
(Dar'a City)

Governorate	Est. apt. units	Est. other types
Rif Dimashq	273,785	253,610
Homs	122,048	190,882
Hama	65,342	202,779
Dar'a	18,080	120,080

HAMA
HOMS
RIF DIMASHQ
DAR'A

Governorates not included in coverage

HAMA
0.87%
2.35%
5.15%
6.67%
84.96

HOMS
3.11%
10.87%
16.59%
64.64%
4.78%

DAR'A
3.66%
1.05%
24.34%
64%
6.95%

RIF DIMASHQ
3.47%
9.06%
8.21%
76.03%
3.23%

■ Partially damaged apartment units	■ Partially damaged other types	■ No damage to housing
■ Destroyed apartment units	■ Destroyed other types	
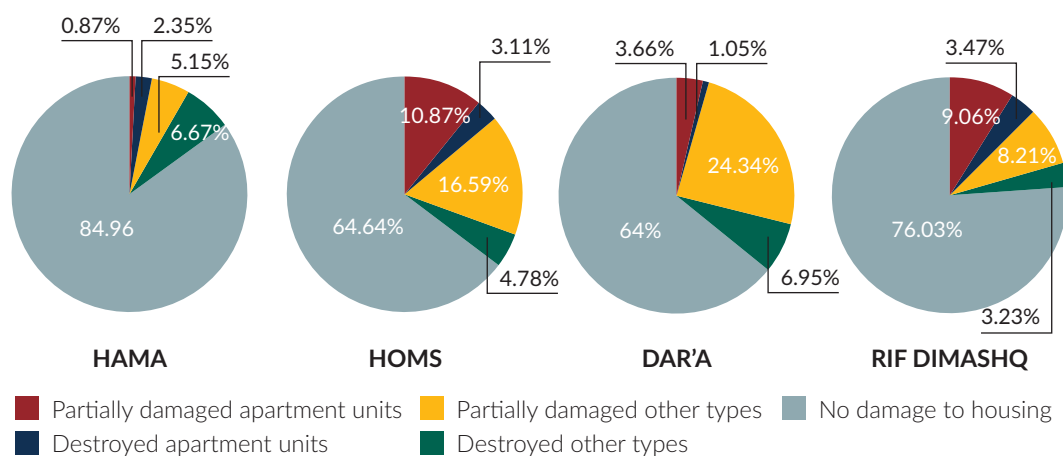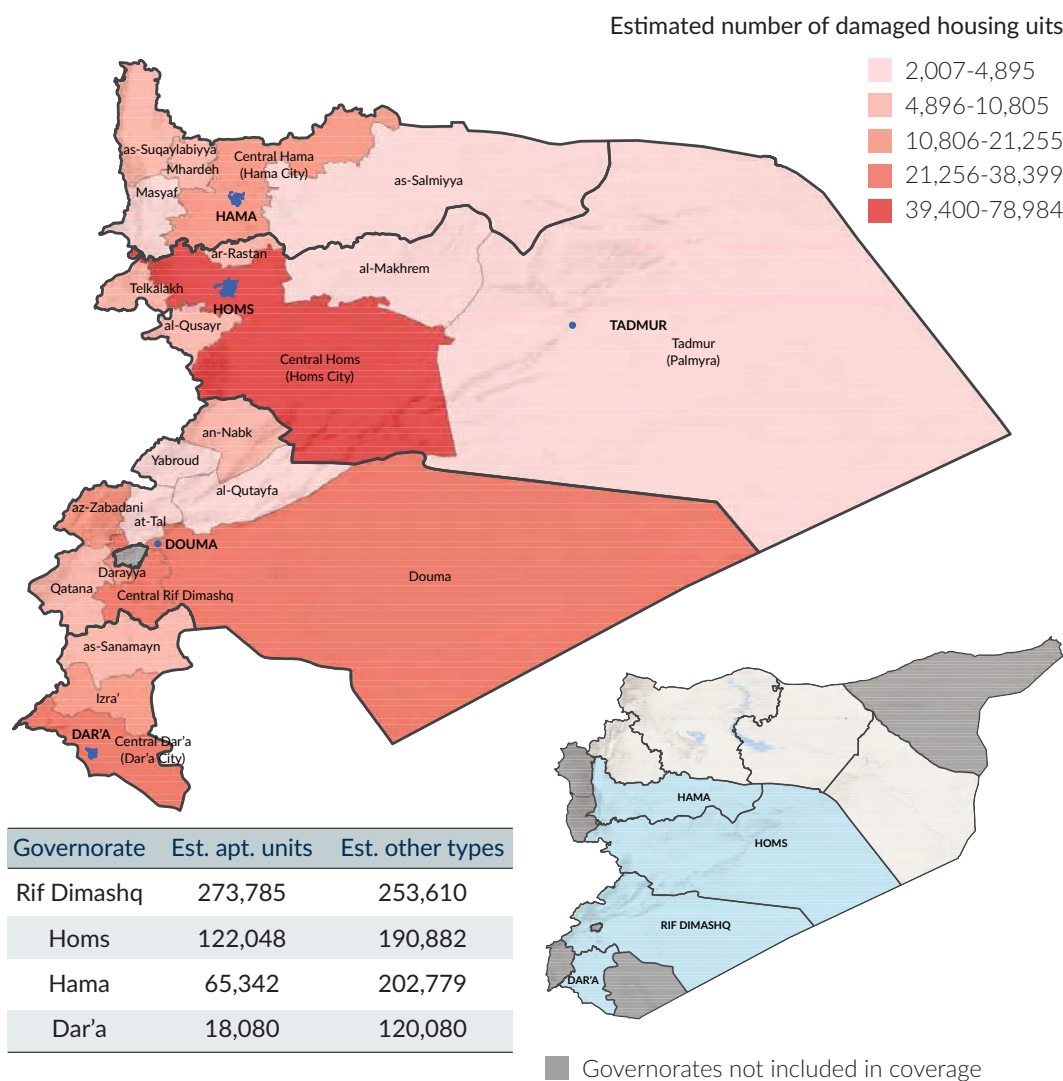
Source: World Bank staff calculations.

Table 2.2: Housing Damage Estimates across Governorates

Governorate	Units in 2010	Damaged units in 2017		Damaged units in 2017 (% of 2010 value)	
		Partial damage	Destroyed	Partial damage	Destroyed
Aleppo	889,884	236,947	68,743	23.3	7.5
Raqqa	145,374	27,054	8,899	12.9	4.3
Dar'a	157,430	44,081	12,596	12.0	3.0
Rif Dimashq	600,955	103,794	40,259	18.5	4.7
Dayr az-Zawr	171,679	48,070	13,734	31.2	10.0
Homs	356,577	97,936	28,144	17.3	5.8
Hama	305,518	18,402	27,547	2.5	3.0
Idlib	261,302	73,165	20,904	25.3	6.3
Total	2,888,719	649,449	220,826	22.8	8.6

Source: World Bank staff calculations.

The damage reported here should be interpreted as lower bound estimates.
First, the damage assessments are based on actual physical conditions, as seen from January 2017. Therefore, the actual damage inflicted by the conflict may be higher if there has been some reconstruction in the area. Although it was not possible for this study to estimate the damage without reconstruction, rough estimates of reconstruction are summarized in map 2.4. Kobane ('Ayn al-'Arab) district in northeastern Aleppo governorate has witnessed one of the most extensive reconstruction campaigns anywhere in Syria over the course of the conflict, from the time when predominately Kurdish militias drove Islamic State fighters from the area in 2015. Second, the analysis presented here does not capture variations in the quality of the housing units. UN-OCHA (2016) reports that with massive migration to safer areas, adequate housing is simply not available in many locations, resulting in people sheltering in substandard housing (UN-OCHA 2016). The pressure on rental demand in these perceived safe urban areas has increased rental rates at an estimated range of between 500 and 1,000 percent. Families often inhabit (sometimes even rent) shells of houses (apartments without finishing, windows, or doors) after sealing the open windows and doors with plastic sheets and curtains. These should unambiguously have an impact on the actual values of damage. Third, the damage assessment does not capture the effects of conflict on housing investments that would take place in the absence of conflict. A background note to this report (Akbar 2017) performs back-of-the-envelope calculations to come up with a ballpark measure of these foregone investments. Accordingly, the loss of new housing stock is estimated at 330,784 unbuilt residential units across the eight governorates.

The destruction in Syrian cities has also created another problem: debris. The conflict-related damage has led to large-scale debris accumulation in Syrian cities, which may require massive amounts of clearance, transportation, and processing or disposal. In a pilot study conducted for this report, remote-sensing-based analysis was used to analyze the extent and concentration of debris accumulation in Aleppo and Homs (map 2.5). The results show that about 14.9 and 5.3 million tons of debris have accumulated in these cities, respectively. To put these figures in perspective, in Aleppo, it would take about six years of continuous work and 26 million truck-kilometers to clear the debris. In comparison, in Homs, it would take about 2.5 years and 2.3 million truck-kilometers. It is also important to note that the debris removal and processing poses significant organizational challenges: it is costly; it takes time to clear; and the operations impose further environmental risks, including dust, carbon dioxide emissions, and water resource pollution. Thus, locating crushing sites often faces resistance from locals.

Map 2.4: Reconstruction, by Governorate and District
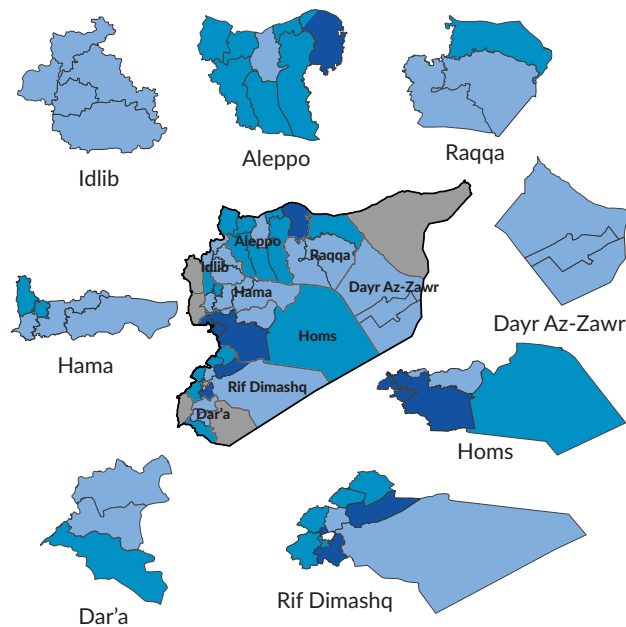
GOVERNORATE RECONSTRUCTION
By District (ADM2) Relative Reconstruction Level

■ Extensive
■ Moderate
■ Limited to none

Map 2.5: Calculated Debris Accumulation, as of February 2017

Aleppo
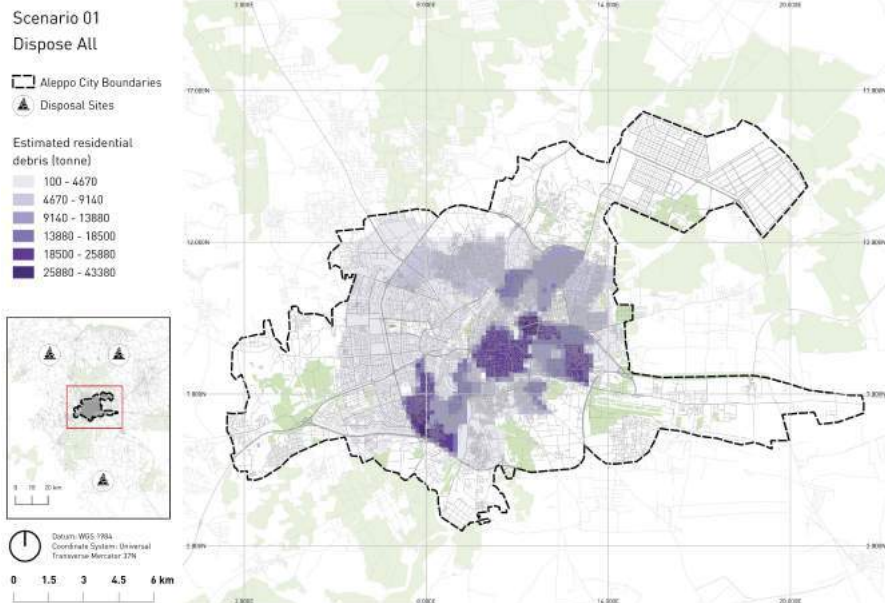
Homs
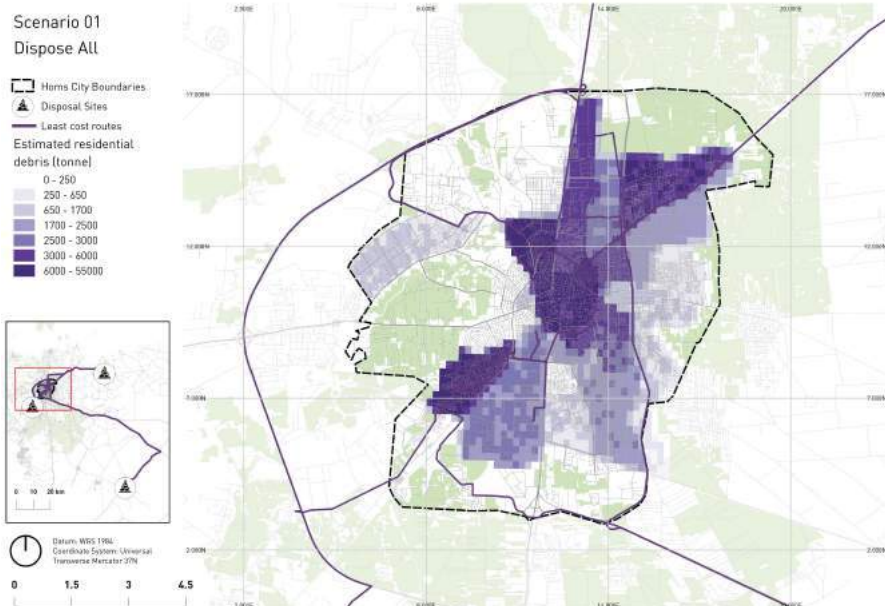
Source: World Bank staff calculations.

Water and Sanitation Infrastructure

The Syrian economy became increasingly vulnerable to water scarcity in the decades preceding the conflict. Syria is technically not a water scarce country like some of its neighbors.[13] However, with policies that do not encourage the sound management of resources, it has been perceived as water scarce (Barnes 2009). The combination of drought, poor governance, and highly inefficient flood irrigation, combined with that around half of the irrigation water comes from groundwater pumping, has led to a situation of rising production costs as well as depleting groundwater tables (Gleick 2014). Many households drill their own wells in rural and urban areas; control over drilling of wells is limited. Around 78 percent of all groundwater withdrawals are deemed unsustainable in Syria (Wada, van Beck, and Bierkens 2012).

Water shortages were common before the conflict. Potable water coverage was almost universal prior to the conflict; however, most regions suffered from shortages, particularly during the summer when supply was rationed to only for a few hours a day. Demand management has received much less attention. Illegal connections in new settlements located in urban areas were common before the crisis, and tariffs were at below cost-recovery rates. More than two-thirds of subscribers paid the lowest tariff, equal to 6 U.S. cents per cubic meter, as reported in 2009.

The conflict has significantly deepened the problems in access to water. This study assessed the physical damage in 457 water supply and sanitation infrastructure assets across eight governorates (table 2.3). Overall, nearly two-thirds of the water treatment plants, half of the pumping stations, a third of the water towers, a quarter of the sewage treatment plants, and a sixth of the wells have been destroyed or partially damaged across Syria. However, the damage exhibits significant variation across regions. For instance, in Raqqa, almost all the infrastructure remained damaged at the time of this assessment. In contrast, almost all assets were intact in Kobani, reflecting the extensive reconstruction efforts after the liberation of the city from the ISIS siege.

Physical damage does not fully reflect the mounting complexity of delivering water and sanitation services. The remote-sensing-based damage assessments presented here do not identify directly the level of damage to piped networks for water distribution, drainage, or sewerage, because of difficulties in assessing the functionality of subsurface assets. In addition, because water is pumped by using electricity, the functionality of water services is determined by the status of the electric grid and the availability of

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[13] Syria is characterized by an arid to semi-arid climate and generally has a high level of climatic variability, that is, part of the country is very green and receives ample rainfall; other parts are very dry. Most of the rainfall occurs during the winter months. The coastal region receives high levels of rainfall; other parts of the country receive significantly less. Surface water is estimated at 10 billion cubic meters and groundwater at 6 billion cubic meters annually. Irrigation consumes around 87 percent of the available water resources, versus 9 percent for domestic use and 4 percent for industry.

generators and fuel. Lack of electricity was the main reason for service outages, with damage to pumping stations and piping networks being the second most common problem.

Table 2.3: Damage in Water and Sanitation Infrastructure (Eight Governorates)

Asset type	Baseline coverage	Destroyed	Partially damaged	Total damaged	Percentage of assets with damage
Well	234	3	29	32	14%
Water Tower/Tank	176	18	34	52	30%
Water Treatment Plant	8	0	5	5	63%
Sewage Treatment Plant	4	0	1	1	25%
Dam	6	0	0	0	0%
Other Drainage Str.	3	1	1	2	67%
Pumping Station	21	0	12	12	57%
Storage Reservoir	2	0	0	0	0%
Water/Sanitation Office	3	2	1	3	100%

Source: World Bank staff calculations.

Water shortages have prompted various coping mechanisms. Syrians have reverted to alternative mechanisms to restore water access, especially during long episodes of public water network outages. According to the United Nations, in Hama, 60 new wells were developed by the water authority, to maintain pipeline supply. In Aleppo, more than 300 old and new wells provided much-needed water supplies, including private and mosque wells. There were more than 65 public water trucks delivering water from more than 550 holding tanks that ranged in size between 5 and 95 cubic meters, which were then refilled by water from wells. The city is working on installing 140 more holding tanks in eastern Aleppo, and there are more than 1,500 private water trucks providing water to residents. In addition to shortages, there are also many complaints about the quality of water and the soaring price of water trucks ($12 for 1,000 liters of water).

Power Infrastructure

The electricity sector was already weak and in need of reform before the conflict. Demand for electricity was increasing steadily and at a faster rate than expansion in generation capacity, leading to outages and load shedding. Load shedding in 2009 was 671 gigawatt-hours (GWh), compared with 391 GWh in 2008, and was expected to continue in the following years. Significant technical and nontechnical losses and deteriorating infrastructure resulted in poor reliability and insufficient supply of electricity, affecting economic and

social development. Technical losses of the transmission and distribution network amounted to 15.9 percent in 2010. Nontechnical losses (caused by theft, errors in meter reading and billing, and so forth) were 9.9 percent of the total system demand in 2010. The demand-supply gap and the high level of losses reflected insufficient investment and poor sector governance. New investment was difficult to attract because of low domestic electricity tariffs, which averaged to 4.42 U.S. cents/kilowatt-hour (kWh), compared with 12.9 U.S. cents/kWh for electricity exports.

Physical damage to electricity infrastructure from the conflict has been severe, but the functionality of the transmission grid has so far been largely maintained despite that it spans different areas of control. According to media reports and the damage assessment, secondary infrastructure (power lines and substations) appears at least partially functional. However, although the national grid remains largely functional (map 2.6), with major transmission links still in place, service quality is very poor in most of the country, and some areas have been disconnected from public supply for years. The three hydroelectric dams and five of the 13 major power plants for which information was available remain fully operational, and two other power plants are partially functioning (map 2.6). The two major plants that were fully destroyed by fighting are the Zeyzoun Power Plant in Idlib governorate (544 megawatts (MW) installed capacity) and Aleppo Thermal Power Station in Aleppo governorate (1,065 MW installed capacity). Al-Teem Power Station, a minor electricity plant near the city of Deir ez-Zor (100 MW installed capacity), is also fully destroyed.

Although the institutional arrangement is unclear, electricity is distributed outside the boundaries of government controlled areas. Anecdotal evidence shows that the government implicitly and explicitly coordinates with the different rebel groups to ensure that power plants are serviced even if those plants are under rebel control. There is no further information on how this arrangement works.

Disruptions to service delivery have been overwhelming, as fuel shortages and conflict-driven constraints to operation and maintenance have led to a sharp drop in public power supply. Power generation declined to 16,208 GWh in 2015, compared with 43,164 GWh in 2010, a drop of 62.5 percent. Much of this decline appears to be due to fuel shortages, as available generation capacity declined by only about 30 percent in the same period. The fuel shortages appear to apply to heavy fuel oil and natural gas. The consumption of heavy fuel oil and natural gas for power generation fell by 70 and 54 percent, respectively, between 2010 and 2015. Demand has also declined due to the conflict, with annual peak load falling from 9,595 MW in 2012 to 5,471 MW in 2015. Nevertheless, the fact that the drop in generation is much sharper than in peak demand suggests that the main constraint is on the supply side.

Map 2.6: Estimated Damage to Major Power Sector Assets
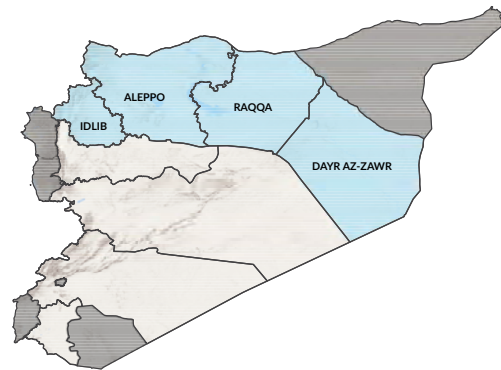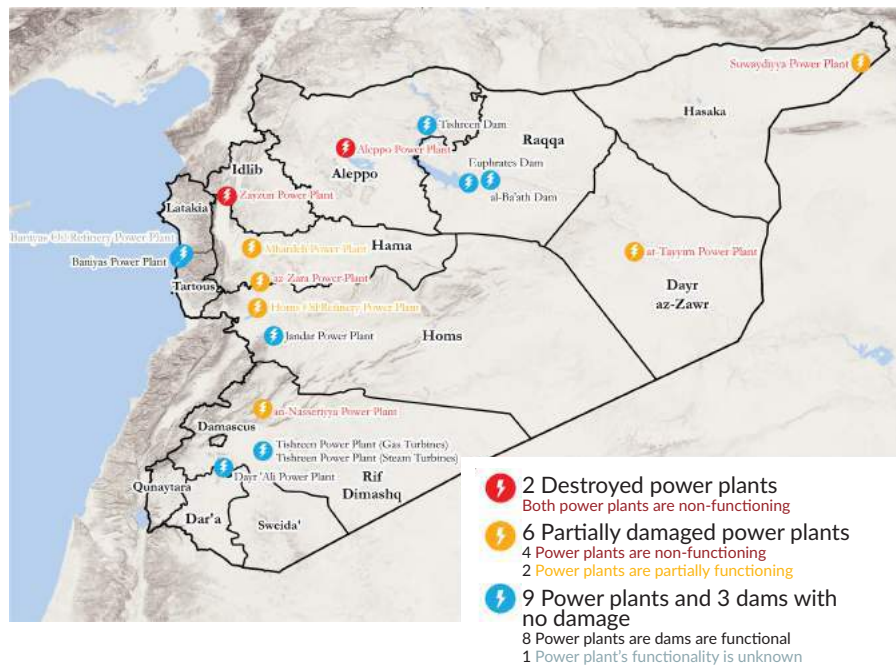

Source: World Bank staff calculations.

Table 2.4: Status of the Electricity Grid and Major Power Infrastructure in Seven Cities in Syria (%)

City	Physical status			Operational status		
	No damage	Partial damage	Destroyed	Functioning	Partial function	No function
Aleppo	89.39	3.81	6.80	0.33	99.00	0.66
Idlib	94.29	1.43	4.29	92.86	2.86	4.29
Hama	99.24	0.51	0.25	0.25	99.75	0.00
Kobani	66.67	33.33	0.00	66.67	0.00	33.33
Tadmur	30.00	70.00	0.00	10.00	90.00	0.00
Douma	88.24	5.88	5.88	23.53	64.71	11.76
Raqqa	94.59	0.00	2.70	13.51	86.49	0.00

Source: World Bank staff calculations.

The decline in electricity supply has caused major disruptions in Syrians' lives (table 2.4). The majority of cities receive only a few hours of electricity a day. The government has applied a rationing policy via load shedding throughout the country. Electricity availability varies considerably among districts within a single city, as well as between urban and rural areas. Schedules adjust irregularly and with little warning, primarily in accordance with fuel availability. Strategic diversion of electricity is common, for example, for harvests, irrigation, or the need to maintain critical infrastructure, such as hospitals.

Electricity shortages have induced various coping mechanisms. Because of the crisis, black markets for fuels and electricity-generating supplies have flourished. Fuel prices vary significantly across cities, depending on accessibility and different government pricing schemes across regions. Commercial and private generators as well as car batteries (charged from the grid or other sources) serve as the main source of electricity for households in many conflict-affected cities. Surveys conducted in Aleppo, Homs, and Idlib show that only a small percentage of the respondents relied solely on the public grid for power generation (figure 2.1). Many households converted small electrical appliances to work with 12-volt car batteries.

The Syrian government continues to subsidize electricity, but it is unclear to what extent. Electricity subsidies continue to pose a burden on government resources. Although we do not have data on the actual amount of electricity subsidies, local media sources report targeted increases in electricity prices in an attempt to free government resources. Electricity tariffs vary based on the type of consumer, volume of electricity used, and voltage. Most electricity subsidies go to household consumption at lower levels of monthly usage.

Figure 2.1: Sources of Electricity Supply in Three Conflict-Affected Cities

ALEPPO — 4.7%, 4.7%, 18.7%, 49.5%, 60.7%

IDLIB — 4.7%, 1.9%, 21.3%, 49.1%, 64.8%

HOMS — 5.5%, 0.9%, 29.1%, 31.8%, 67.3%

Legend:
■ Always from the grid   ■ Car batteries   ■ No alternative
■ Private generator   ■ Purchase from private providers
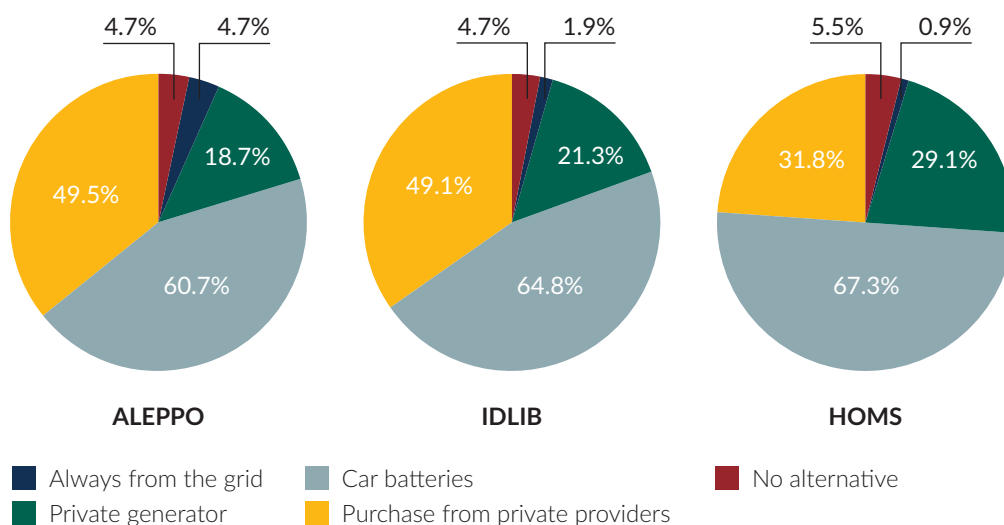
Source: United Nations.

Transportation Infrastructure

Syria's roadway network expanded rapidly before the conflict, to keep pace with the fast-growing economy and population. In the decade preceding the conflict, the road network grew by 10 percent, of which 70 percent was asphalted. This increase was more than matched by the increase in the number of vehicles. Six years of economic reforms, including a reduction in import taxes from more than 250 to 50 percent, and the introduction of bank credits for purchasing cars, created an unprecedented surge in the number of vehicles on the road. According the Syrian Central Bureau of Statistics, the total number of registered vehicles registered in Syria increased from 1.2 million in 2006 to 2.1 million in 2010.

Syria's well-developed network of motorways is located mainly in the western half of the country (map 2.7). The Motorway System is a divided, multi-lane highway along the Damascus–Homs–Hama–Aleppo corridor, with extensions to the Mediterranean Ports of Tartous and Lattakia, and to Jordan to the south and Lebanon to the west. The secondary road network was generally in good condition and additional road construction was underway to extend the major highway network to include a link from Lattakia to Aleppo. Motorways and secondary roads have weight-load limits, and weigh stations operate to limit truck overloading. The eastern part of the country is only connected through two-lane roads due to the sparsity of the population. In 2010, the total distance of the road network in Syria was 69,837 kilometers (km), of which 45,345 km was paved (including 1,103 km of expressways). M5 is the most important motorway in the country. At 474 km in length, it functions as the backbone of the national network. It connects the border with Jordan in the south with Damascus, the capital, and continues further north to Aleppo, the country's second largest city. Other cities connected by this motorway are Daraa, Al Nabk, Homs, and Hamah.

The conflict has damaged the transport infrastructure significantly. The physical impact of the conflict can be classified in two major categories: (i) damage due to exploding bombs and ordinance, causing craters and surface depression; and (ii) collateral damage due to falling debris from destroyed buildings, road cuts, and checkpoints, making large sections of the road inaccessible and restricting the movement of people and vehicles. The data analysis provides an estimate of the total linear length of roads and bridges damaged and undamaged in the 10 surveyed cities. The estimate extends beyond the surveyed roads within a city, to include other roads as well. Interpretation of this type of information comes from comparing satellite imagery maps with the data.

Map 2.7: Major Roads and Railways
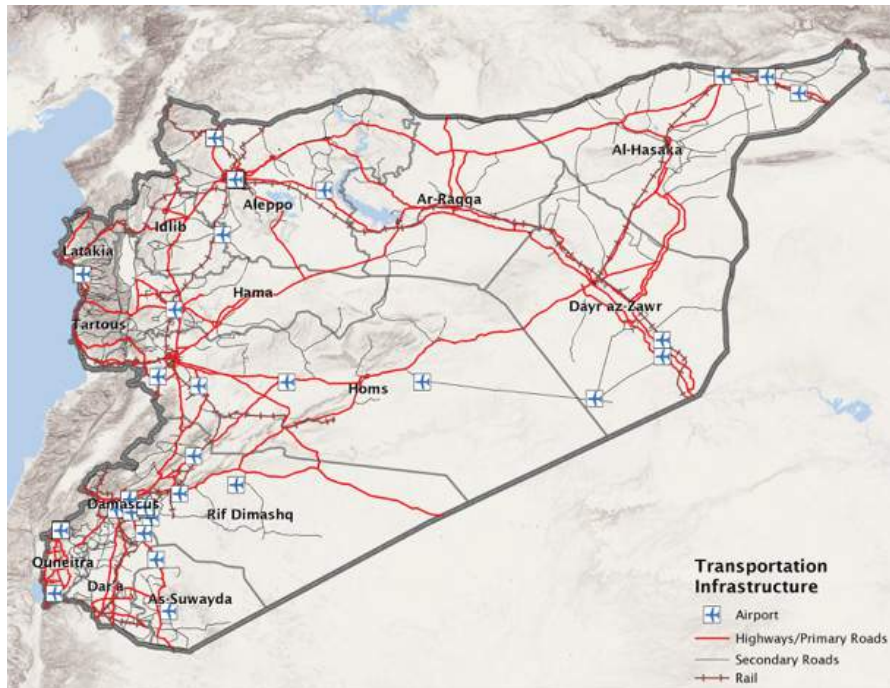
Source: Courage Services.

Figure 2.2: Damages to Intra-City Roads
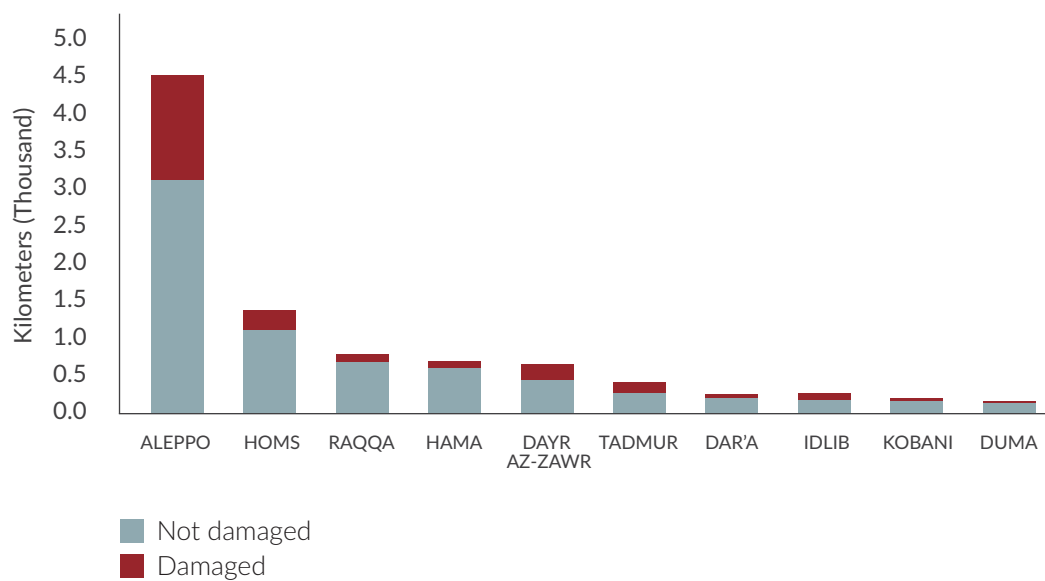
Source: World Bank staff calculations.

Primary roads and trunk roads have received the most damage within cities.[14] Throughout the 10 cities, a total of 30 km of roads and nine bridges were damaged or destroyed. The majority of the road damage in the 10 cities is conflict-related, mainly attributed to bombardment, collateral damage, lack of maintenance, and man-made barricades. Aleppo is the most impacted city, accounting for the majority of the damages in the 10 cities, in absolute and relative terms (figure 2.2). With the latest escalation of the conflict, damage to Aleppo's road transportation sector doubled from September 2016, reaching 44 percent damage in February 2017. However, the impact on road functionality extends far beyond direct road damage. Large segments of roads are often rendered inaccessible due to direct damage to short segments that has substantial impact on overall mobility.

Airports, railways, and ports have also sustained damage. Syria has 26 airports with paved runways, and five airports with runways of more than 3,000 meters. Prior to the conflict, Syria's three international airports, at Damascus, Aleppo, and Latakia, together handled an annual average of 2.5 million passengers on 13,000 flights. Currently, the Damascus Airport is the only airport operating international flights. The Syrian railway system (2,423 km in total length) is nonoperational due to the conflict.

The conflict has not only led to physical destruction of the road network, but also disrupted mobility and eliminated connectivity within the country and the region. Road-based travel distances across the country have increased as conditions related to conflict, weather, and other factors have forced travelers to take less direct, alternative routes to reach their destinations. Figure 2.3 shows the minimum road-based travel distance between the most prominent cities in each governorate before the conflict. Next, using publicly available reporting and satellite imagery on damage and other restrictions, this analysis assessed the operational status of each route segment (as of March 2017), to calculate the minimum distance that needs to be traveled by civilians to go from one city to another. In nominal terms, the connectivity of Dayr az-Zawr was the most diminished. Compared with pre-conflict travel, it took an additional 155 km to reach Damascus, 170 km to Dar'a, and 187 km to Hasaka. The latter was the largest proportional increase in travel distance (42.6 percent) among all the cities analyzed here.

Health Care Facilities

Before the conflict, physical infrastructure capacity in health care was below the averages in the Middle East and varied significantly by region. From 2005 to 2010, hospital bed ratios increased from 1.4 to 1.5 per 1,000 people,

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[14] The damage assessment for the road transport sector in Syria covers the following road asset classes: motorway, trunk road, primary road, secondary road, tertiary road, track, residential road, service road, and bridges. The assessment only covers physical damage to roads and bridges, and does not include additional inter-urban infrastructure assets, such as traffic lights, culverts, road and highway inventories, private cars, fuel facilities, and public buses.

Figure 2.3: Changes in Connectivity: Pre-Conflict versus De Facto Distances, March 2017

PRE CONFLICT GOVERNORATE CAPITAL, TOTAL TRAVEL LENGTH IN KILOMETERS

	Damascus	Dar'a	Dayr az-Zawr	Aleppo	Idlib	al-Qunaytara	Homs	Hama	Hasaka	Raqqa	Tartous	Latakia	Sweida
Damascus													
Dar'a	101												
Dayr az-Zawr	448	544											
Aleppo	350	450	321										
Idlib	306	407	384	62									
al-Qunaytara	64	70	512	413	370									
Homs	162	263	359	188	145	226							
Hama	211	311	380	142	99	274	49						
Hasaka	618	718	253	364	425	681	458	442					
Raqqa	432	532	137	197	260	495	272	256	189				
Tartous	253	354	455	233	182	317	97	110	548	362			
Latakia	320	420	496	175	116	383	158	140	538	372	140		
Sweida	101	54	517	438	394	95	250	299	706	520	341	408	

CURRENT GOVERNORATE CAPITAL, TOTAL TRAVEL LENGTH IN KILOMETERS

	Damascus	Dar'a	Dayr az-Zawr	Aleppo	Idlib	al-Qunaytara	Homs	Hama	Hasaka	Raqqa	Tartous	Latakia	Sweida
Damascus													
Dar'a	111												
Dayr az-Zawr	603	714											
Aleppo	391	502	354										
Idlib	359	470	428	74									
al-Qunaytara	68	78	670	458	426								
Homs	170	281	442	221	190	237							
Hama	225	336	421	167	138	292	55						
Hasaka	738	849	441	416	488	805	577	556					
Raqqa	460	570	163	211	285	527	299	278	278				
Tartous	259	370	528	274	206	326	97	110	663	385			
Latakia	328	438	548	213	140	394	164	140	627	405	140		
Sweida	102	83	694	482	450	108	262	316	829	551	350	419	

CURRENT GOVERNORATE CAPITAL, TOTAL TRAVEL LENGTH % INCREASE

	Damascus	Dar'a	Dayr az-Zawr	Aleppo	Idlib	al-Qunaytara	Homs	Hama	Hasaka	Raqqa	Tartous	Latakia	Sweida
Damascus													
Dar'a	8.2%												
Dayr az-Zawr	25.7%	23.7%											
Aleppo	10.6%	10.2%	9.3%										
Idlib	14.8%	13.4%	10.4%	15.3%									
al-Qunaytara	4.9%	9.9%	23.6%	9.7%	13.2%								
Homs	4.8%	6.5%	18.7%	15%	23.7%	4.7%							
Hama	6.3%	7.2%	9.7%	14.7%	28.6%	5.9%	10.9%						
Hasaka	16.3%	15.4%	42.6%	12.5%	13%	15.3%	20.6%	20.5%					
Raqqa	6.1%	6.7%	15.7%	6.6%	8.9%	5.9%	8.9%	7.8%	32.1%				
Tartous	2.2%	4.3%	13.7%	14.9%	11.7%	2.7%	0%	0.1%	17.4%	6%			
Latakia	2.5%	4.1%	9.4%	17.6%	17.7%	2.8%	3.2%	0%	14.3%	8%	0%		
Sweida	0.8%	34.4%	25.5%	9.2%	12.5%	12.1%	4.3%	5.5%	14.9%	5.7%	2.5%	2.7%	

Source: World Bank staff calculations.

hovering slightly below the MENA average of 1.6 beds/1,000 people in 2009
(WDI 2017). According to the Ministry of Health, there were 498 hospitals in
Syria in 2010 (MOH 2011). Bed capacity also showed large geographic
variation: Idlib, with a population of roughly 1.5 million, accounted for only 3.9
percent of total beds, while Aleppo, with a population of about 2.4 million, had
20.1 percent of total beds (Syria Central Bureau of Statistics 2011). Although
this study did not have full access to relevant data, it is likely the governorates
in the northeast, including Hasaka and Raqqa, had significantly inferior access
to health care facilities.

**Hospitals have not been immune from attacks in the conflict; they have been
specifically targeted and used for military purposes.** Physicians for Human
Rights has documented attacks on 400 facilities (some multiple times) and the
deaths of 768 health personnel in Syria between March 2011 and the end of
July 2016. These figures are corroborated by the Syrian American Medical
Society, which documents a nearly 90 percent increase in number of attacks
on medical facilities and personnel in Syria following the May 3, 2016 passage
of United Nations Security Council Resolution 2286, which condemns attacks
on medical facilities and personnel in conflict zones (Syrian American Medical
Society 2017). Unfortunately, since these data were collected in July 2016,
the attacks on health facilities have continued, with further bombing of key
hospitals in Aleppo in April, May, and December 2016. It is now estimated that
an attack takes place on medical facilities or personnel every 48 hours (Syrian
American Medical Society 2017).

**Six in 10 health facilities in the 10 surveyed cities, including hospitals,
medical centers, medical points, and polyclinics, have faced some form of
damage as of February 2017.** The health infrastructure is in grave condition.
In eight of the 10 cities surveyed, more than half of all types of health facilities
were impacted by the conflict. Overall, 16 percent of all health facilities were
completely destroyed and 42 percent were damaged partially. The degree of
physical damage suggests that local communities' access to the quality health
care services they need is severally limited by the civil conflict in all 10 cities.
This situation affects not only those who need emergency medical care, but
also patients who require care for noncommunicable diseases, chronic
conditions, maternal and child health, and mental health services. Activities
related to disease surveillance are also hampered, exposing the population to
the risks of disease outbreaks.

**The degree of damage to health infrastructure varies considerably across the
10 cities.** In Aleppo, 14 hospitals and 57 medical centers were destroyed as of
December 2016. This corresponds to 35 percent complete destruction of
pre-conflict health infrastructure in Aleppo, one of the highest across the 10
cities (figure 2.4). The damage in Raqqa and Dayz az-Zawr has also been
extensive. As of February 2017, in both cities, almost nine in 10 health facilities
suffered some form of damage. The share of health facilities that were partially
damaged reached 80 percent in Raqqa and 79 percent in Dayz az-Zawr. The

Figure 2.4: Damage to Total Health Facilities, by City
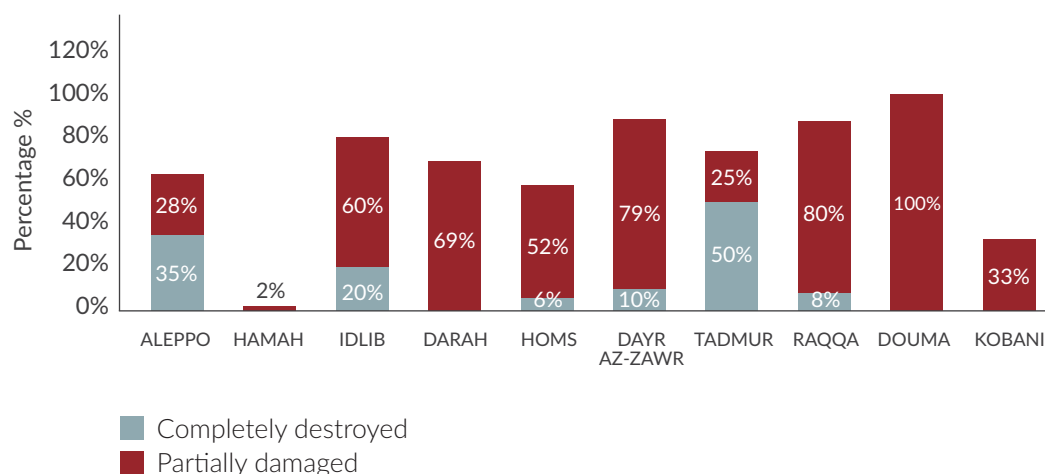
Source: World Bank staff calculations.

health infrastructure in Idlib also suffered severe destruction. As of February 2017, eight in 10 health facilities experienced some degree of damage.

Damage also varied by facility type and ownership. As of February 2017, 54 percent of all hospitals in the 10 cities received some form of damage. The lower levels of care were also not shielded from the conflict. As of February 2017, approximately 68 percent of all medical centers, 84 percent of specialized medical centers, 75 percent of medical points, and 51 percent of all polyclinics experienced some form of physical damage (figure 2.5). Among damaged hospitals, there was considerable variation between public and private hospitals with respect to the degree of damage. As of February 2017, an estimated 60 percent of all public hospitals and 48 percent of private hospitals were completely destroyed or partially damaged in the 10 surveyed cities. More specifically, about 11 percent of all public hospitals were completely destroyed and almost 50 percent of them were partially damaged. In the private sector, the proportion of hospitals that were destroyed reached 9 percent, and almost 40 percent experienced some level of damage.

The targeting of health facilities and medical personnel has led to provider flight and a hollowing out of the entire health system. Data on the number of physicians, nurses, and other health workers who fled are limited, but efforts are ongoing to map the size of this workforce exodus and the location. According to Physicians for Human Rights, at least 15,000 of Syria's 30,000 physicians have left. Particularly hard-hit areas have seen even greater losses. Of Aleppo's 6,000 physicians at the start of the conflict, fewer than 70 were still in the city as of 2014 (PHR 2015).

United Nations organizations and nongovernmental organizations working inside Syria report an acute shortage of health professionals. Often medical residents or, in several cases, veterinarians are the only providers in towns under siege. There is an especially acute shortage of female doctors (especially obstetricians and gynecologists), which has severely affected access to health care for half the population. Due to the unpredictable security situation, women are increasingly scheduling caesarian sections (as opposed to having a normal vaginal delivery, which is difficult to predict) and leaving as soon as they come out of anesthesia due to fear of their hospital being bombed. This procedure is considered a major surgery and usually requires an inpatient stay of four to five days to ensure safe recovery. Health care providers are often forced to use innovative methods like providing diagnosis via Whatsapp or other video-over-Internet applications with specialists abroad, due to physician shortages; training future cadres of health professionals through online courses held in bunkers; and developing cross-border pharmaceutical supply chains and payment systems to allow for medicines and salaries to reach besieged towns.

Figure 2.5: Damage to Health Facilities, by Facility Type, February 2017
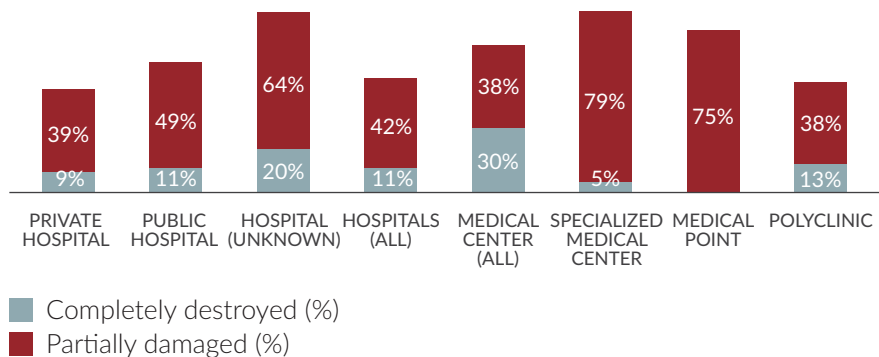
Source: World Bank staff calculations.

Physical damage reflects only a subset of the effects of the conflict on the health sector (map 2.8). The physical damage discussed here does not capture many direct inputs to the provision of health care service, including machinery, tools, and other medical supplies. Moreover, direct destruction of infrastructure in other sectors, including transportation, energy, and water, surely further cripples access to health care and service delivery, including maintenance of critical drug supply chains and referral networks.

More people may have been killed in Syria due to a breakdown of the health system than due to direct fatalities from the fighting. The destruction of the existing health infrastructure has led to a deterioration of health status across the country, with a reemergence of communicable diseases, heightened impact of noncommunicable diseases, and increasing burden of injuries. For

instance, polio, long thought to be eliminated, has reemerged and spread across the country, due to the inability of routine immunizations to take place (Sparrow 2014). As summarized by Zaher Sahloul, the head of the Syrian American Medical Society, some 200,000 people are believed to have died in Syria because they did not have access to routine medical care as of February 2014 (Baker 2014). These are in effect a "secondary death toll" that is even higher than those killed by bombs and firearms (Baker 2014). "These are the women who died in labor because there was no one to do a C-section, or the men who have a heart attack and can't find a physician, or have complications from diabetes. People are dying of chronic diseases that three years ago would have been completely manageable" (Baker 2014).

Mental health conditions are worsening, with an entire generation of children showing signs of "toxic stress." The Syrian Public Health Network estimated an increase in anxiety, depression, and post-traumatic stress disease as a direct result of the conflict (Syria Public Health Network 2016). This is especially acute in children, who are being classified as having levels of "toxic" stress, with more than 70 percent of children recently surveyed reporting they were experiencing bed wetting, a sign of post-traumatic stress disorder (Save the Children 2017). It is not difficult to see why: two-thirds of children are said to have lost a loved one, or had their house bombed or shelled, or suffered conflict-related injuries.

Map 2.8: Governorate-Level Damage to the Health Sector

ESTIMATED DAMAGE TO SYRIA'S HEALTH SECTOR (within the 8 surveyed governorates)

Estimated number of damaged medical facilities

- 0-7
- 8-18
- 19-28
- 29-62
- 63-172

50% of all medical facilities partially damaged
16% of all medical facilities destroyed

Governorates not included in coverage

IDLIB
22 · 23 · 5 · 5 · 61

ALEPPO
71 · 77 · 10 · 13 · 156

RAQQA
23 · 5 · 3 · 3 · 39

DAYR AZ-ZAWR
30 · 17 · 3 · 5 · 87

- Private hospitals partially damaged/destroyed
- Public hospitals partially damaged/destroyed
- Specialized medical center partially damaged/destroyed
- Medical center partially damaged/destroyed
- Health facilities with no damage

Estimated number of damaged health facilities

- 0-6
- 7-16
- 17-28
- 29-53
- 54-111

as-Suqaylabiyya
Mhardeh
Central Hama
(Hama City)
as-Salmiyya
Masyaf
HAMA
ar-Rastan
Telkalakh
HOMS
al-Qusayr
al-Makhrem
Central Homs
(Homs City)
TADMUR
Tadmur
(Palmyra)
an-Nabk
Yabroud
al-Qutayfa
az-Zabadani
at-Tal
DOUMA
Darayya
Qatana
Central Rif Dimashq
Douma
as-Sanamayn
Izra'
DAR'A
Central Dar'a
(Dar'a City)

HAMA
HOMS
RIF DIMASHQ
DAR'A

Governorates not included in coverage

HAMA
7
26
170

HOMS
43
23
119
1
12

DAR'A
5
23
8
67
12

RIF DIMASHQ
91
85
26
3
10

- Private hospitals partially damaged/destroyed
- Public hospitals partially damaged/destroyed
- Specialized medical center partially damaged/destroyed
- Medical center partially damaged/destroyed
- Health facilities with no damage

Source: World Bank staff calculations.

Education Facilities

Education outcomes were improving until 2010 in Syria, almost reaching the education Millennium Development Goal. In 2009, Syria's primary net enrollment rate (NER) of 93 percent was equal to the average for the MENA region and higher than the average for middle-income countries (90 percent). The NER for secondary school was 67 percent for the same year, above the MENA average of 60 percent. The gender gap in enrollment was negligible, with an NER gender parity index of 0.98 in primary and 1.01 in secondary in 2009.[15] Student learning outcomes in Syria were below international averages but higher than most MENA countries. In the 2007 Trends in Mathematics and Science Study, Syria ranked 32 and 39 of 49 countries for eighth grade science and mathematics, respectively. Compared with other countries in the MENA region, Syria's eighth-grade students ranked third for their performance on the science assessment and fifth on the mathematics assessment.

Education facilities have become military bases and targets during the conflict. Schools have been used as military quarters and informal shelters for displaced community members. Vocational institutes, secondary schools, and education offices were the highest targeted education institutions, with respective percentages of fully damaged facilities of 14.5, 14.7, and 33.3. Primary schools and universities remained almost intact, at 6.8 and 5.8 percent, respectively, for full damage. Education facilities in Aleppo have the highest occurrence of damage, with a total of 49 education facilities destroyed (map 2.9). Da'ra follows this with 21 education facilities destroyed, and Raqqa and Tadmur with seven facilities destroyed. Other governorates such as Kobani, Homs, Douma, and Daya Az-Zawr, have witnessed five or fewer facilities fully damaged, while Hama and Idlib had no education facilities that were fully destroyed. An estimated 57 percent of education facilities are still functioning in Syria. Many schools have limited access to electricity and water and sanitation facilities. In some cases, schools are being over utilized, for instance in Idlib, where the number of students exceeds the capacity of functional schools to absorb students, versus other governorates in the country where schools are highly underutilized due to population displacement and movement.

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[15] World Bank EdStats database.

Map 2.9: Governorate-Level Damage to Syria's Education Sector Facilities

ESTIMATED DAMAGE TO SYRIA'S EDUCATIONAL SECTOR (within the 8 surveyed governorates)

Estimated number of damaged educational facilities

- 37-110
- 111-202
- 203-311
- 312-523
- 524-1,831
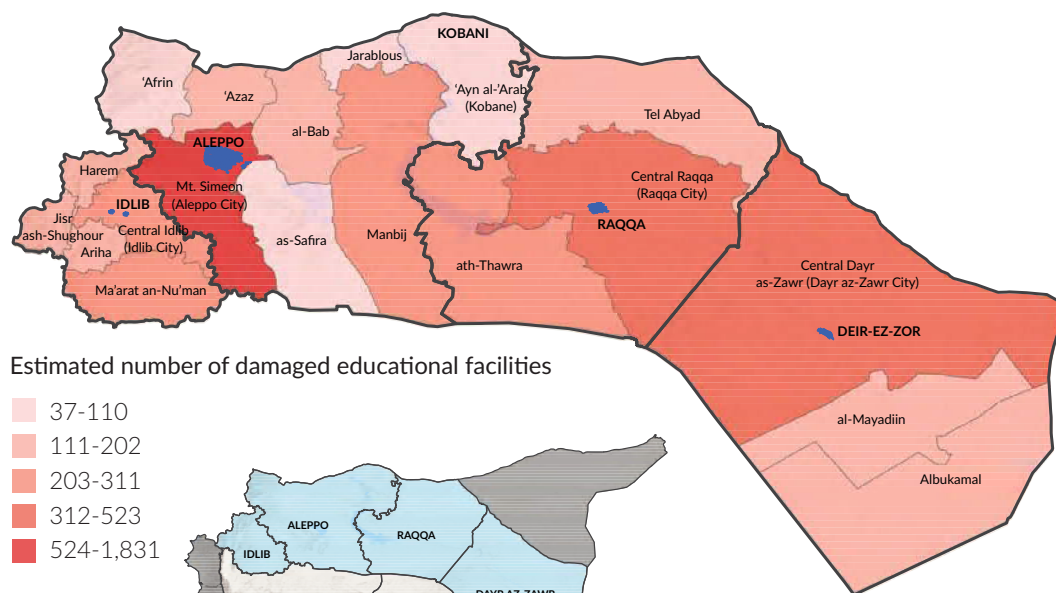
53% of all educational facilities partially damaged
10% of all educational facilities destroyed

Governorates not included in coverage

IDLIB
- 7.48%
- 23.85%
- 68.67%

ALEPPO
- 5.65%
- 26.62%
- 67.73%

RAQQA
- 2.84%
- 42.11%
- 55.05%

DAYR AZ-ZAWR
- 7.98%
- 24.1%
- 67.92%

- Primary school partially damaged/destroyed
- Secondary school partially damaged/destroyed
- Educational facilities with no damage
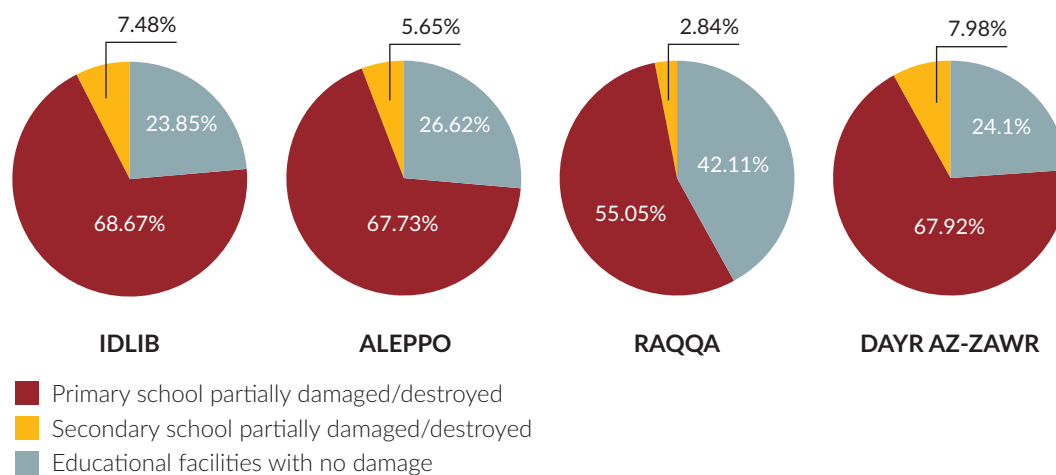
Estimated number of damaged education facilities

- 1-25
- 26-73
- 74-160
- 161-364
- 365-804

as-Suqaylabiyya
Mhardeh
Central Hama (Hama City)
as-Salmiyya
Masyaf
HAMA
ar-Rastan
al-Makhrem
Telkalakh
HOMS
al-Qusayr
TADMUR
Central Homs (Homs City)
Tadmur (Palmyra)
an-Nabk
Yabroud
al-Qutayfa
az-Zabadani
at-Tal
DOUMA
Darayya
Douma
Qatana
Central Rif Dimashq
as-Sanamayn
Izra'
DAR'A
Central Dar'a (Dar'a City)

HAMA
HOMS
RIF DIMASHQ
DAR'A

Governorates not included in coverage

HAMA

- 1.71%
- 13.2%
- 85.08%

HOMS

- 24.97%
- 8.83%
- 66.2%

DAR'A

- 47.64
- 6.89%
- 67.21%

RIF DIMASHQ

- 47.64%
- 45.47%
- 6.89%

Legend:
- Primary school partially damaged/destroyed
- Secondary school partially damaged/destroyed
- Educational facilities with no damage

Source: World Bank staff calculations.

Demographic Dispersion and Loss of Lives and Opportunities

Among all the consequences of the conflict, the effects on human lives and displacement have been the most dramatic. The pre-conflict population of Syria was estimated at 20.7 million in 2010 (World Development Indicators). Since 2011, the conflict has created a complex set of pressures on the country's population. The most recent calculations by the International Organization for Migration (IOM) put the population within Syria at 18.8 million as of November 2016 (table 2.5). Data limitations render a precise and comprehensive decomposition of demographic changes impossible: conflict affects fertility rates and life expectancy alike. In addition, an important portion of demographic movements takes place informally: some refugees remain unregistered and, in certain cases, migrants do not factor into in-country population or refugee totals.

There is significant uncertainty over conflict-related casualties in the country. The casualties that are directly related to the conflict are estimated to be between 400,000 (UN, as of April 2016) and 470,000 (Syrian Center for Policy Research, as of February 2016). This report relies on the IOM demographic indicators, because IOM provides aggregate numbers and an accompanying track of population status within the country at monthly intervals.

Syria has become the largest forced displacement crisis in the world since World War II (box 2.1). Over half of the country's pre-conflict population has been forcibly displaced. According to the United Nations High Commissioner for Refugees (UNHCR), the total number of Syrians presently registered as refugees outside the country in Lebanon, Turkey, Jordan, Iraq, Egypt, and North Africa is 4.9 million (table 2.6). In addition, more than 800,000 Syrian nationals are estimated to have sought asylum in Europe in 2015 and 2016. Many of these individuals have moved more than once, and have not been removed from registration lists in their first country of refuge. These numbers also do not include an estimated 0.4 million to 1.1 million unregistered Syrian refugees in Lebanon, Jordan, Turkey, and Iraq.

The Syrians who fled to reach safety and reasonable living conditions endured very harsh conditions to get there. Departures were often quite rapid, with little time to consolidate assets or sell property—averaging fewer than seven days. Syrians without passports commonly traveled through Syria, a dangerous and expensive endeavor for those who live in the south of Syria, Homs, Hama, or Aleppo, then crossed the border into Turkey illegally. According to the REACH Initiative, the most commonly used crossing point was near the village of Khirbat al-Joz in Idlib governorate. In nearly all cases, money for bribes was reported to add to the cost of the journey through Syria. Once in Turkey, (as of late 2015) Syrians would typically head toward the Port of Bodrum or Izmir before taking a boat to Greece. Smugglers typically arrange boats for an average of US$1,200 per person to the Island of Lesbos. Other boats travel to Chios, Samos, and other islands close to the Turkish coast.

Depending on the weather and the condition of the boat, the journey was reported to take from 45 minutes to several hours. Smugglers did not commonly travel in the boats; instead, a passenger was nominated to navigate the vessel. Once in Greece, new arrivals often reported walking to points where they were registered by the Greek authorities and then boarded boats to mainland Greece. In late 2015, preferred onward destinations included Athens and Thessaloniki, before traveling by bus toward Evzonoi and the border with the Former Yugoslav Republic of Macedonia. From there, Syrians and others typically travel northward (sometimes by train) through Serbia (see map 2.10).

Table 2.5: Key Demographic Indicators

Indicator	Number	Source/Comment
Syria: Pre-war population (2010)	20,720,602	World Bank (WDI figures) based on UN Population Division data and national census reports.
Estimated population within Syria as of December 2016	18,792,029	IOM. UN Population Division projections at 18,564,000 for 2016.
Estimated total number of deaths as a result of conflict since 2011	400,000 – 470,000	UN (400,000 as of April 2016); Syrian Center for Policy Research (470,000 as of February 2016).
Internally displaced persons since 2011*	5,715,168	IOM (Jan 2017). UNOCHA lists 6.3 million IDPs in Dec 2016, including the 513,833 persons "affected by shelter damage" and displaced within their own community as displaced. IOM does not.
Registered Syrian refugees	4,857,617	UNHCR (December 2016, since 2011)
Cumulative Syrian Asylum Applications	884,461	UNHCR (April 2011-Oct 2016). *Note that those arriving in Europe may remain registered in other countries.

Note: IDP =internally displaced persons; IOM = International Organization for Migration; UN = United Nations; UNHCR = United Nations High Commissioner for Refugees; WDI = World Development Indicators.

Box 2.1: The Terminology of Forced Displacement

Forced Displacement

"Forced displacement" refers to the coerced and involuntary movement of a person or persons away from their home or home region due to a well-founded fear of persecution. "Migrants," as opposed to the "forcibly displaced," choose to move not because of a direct threat of persecution or death, but primarily to improve their lives by finding better employment, education, or family reunion opportunities. It is an important distinction, although many population movements (like those to Europe from host countries outside Syria) are "mixed migration" flows, motivated by a combination of these factors.

Refugee

The 1951 United Nations Refugee Convention defines a "refugee" as any person who, "owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country." The Convention defines a universal right of protection from persecution as well as from refoulement, and a right to access work, education, and health care. The Convention is nonbinding, although it is ratified by 145 countries. With the exception of Turkey (which retains a geographical limitation), the countries hosting the majority of Syrians have declined to join the Convention or the subsequent 1967 Protocol.

Asylum Seeker

An "asylum seeker" is a person who has applied for asylum under the 1951 Refugee Convention and the person remains an asylum seeker for as long as their application (or appeal against refusal of an application) is pending. For Syrians, The United Nations High Commissioner for Refugees generally approves all asylum seekers for refugee status. In its broader context, "refugee" means a person fleeing the diverse impacts of conflict but not necessarily fearing direct and personal persecution as defined by the 1951 Refugee Convention.

Map 2.10: Primary Reported Routes through Turkey and the "Balkan Corridor" (as of September 2015)
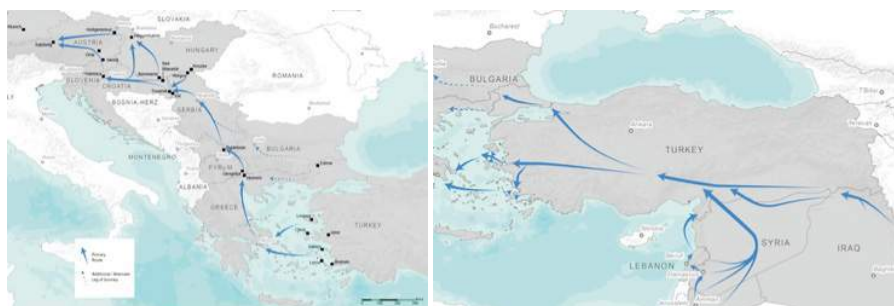
Source: REACH Initiative.

Table 2.6: Total Registered Syrian Refugee Population, by Country/Region, 2012–16

Country	Jan 2012	Dec 2013	Dec 2014	Dec 2015	Dec 2016
Lebanon	6,916	138,213	884,017	1,159,396	1,011,366
Jordan	4,013	116,778	576,354	623,338	655,496
Turkey	9,500	174,598	560,129	1,622,839	2,814,631
Iraq	180	66,920	213,223	233,625	230,836
Egypt. Arab Rep.	924	12,836	131,707	138,212	116,013
North Africa	n/a	n/a	n/a	n/a	29,275
Total	21,533	509,345	2,365,430	3,777,410	**4,857,617**

Source: United Nations High Commissioner for Refugees.

Unlike refugees, most IDPs remained near their place of origin. Among those who have fled within Syria, an average of 56 percent has chosen to remain within their governorate of origin. As a rule, this is typical of internally displaced populations—especially those with fewer resources and among IDPs who believe their displacement will be short-lived. The greatest percentage of intra-governorate displacement was in As-Sweida, due to its geographic isolation and the lines of conflict that encircle the province (figure 2.6). The greatest numbers of IDPs within their provinces were in Aleppo and Rural Damascus governorates.

Most of those who fled their residence remained in Syria, with the exception of those from Idleb, Al-Hasakeh, and Latakia. The governorate of Aleppo reported the highest rate of displacement for flight within and outside Syria, however, with almost equal percentages of the displaced population fleeing within and outside the country. In contrast, the governorates of Idleb, Al-Hasakeh, and Lattakia reported more individuals fleeing out of Syria than within Syria (figure 2.7).

Migration decisions are determined by shelter, security, and food at source and destination. A 2015 World Bank study of push and pull factors driving forced displacement and return in the cities of Aleppo, Homs, and Dar'a is illustrative of some of the factors informing the calculus of decision making, prompting movement (table 2.7). In each location, the dominant push factors driving populations from their homes were the lack of shelter, physical security concerns, and ultimatums by authorities. Ethnic division and partisan factors also drove residents from their home areas. Dominant pull factors included access to shelter, availability of food (bakeries/bread in particular), security, and kinship/partisan affiliations.

Figure 2.6: Destination and Origin Governorates of IDPs

Top governorates of destination for 5,542,996 people fleeing their locations	An averagre of 56% of IDPs are displaced within their governorate of origin…

Intra-governorate displacement in:

29% in Aleppo
22% rural Damascus
14% Idlib
7% Ar-Raqqa
7% Homs
6% Damascus
5% Dar'a
2% Tartous
29% Quneitra

95% As-Sweida
89% Aleppo
78% Dar'a
70% Idlib
66% Al-Hasakeh
62% Ar-Raqqa
61% Rural Damascus
59% Homs
51% Quneitra
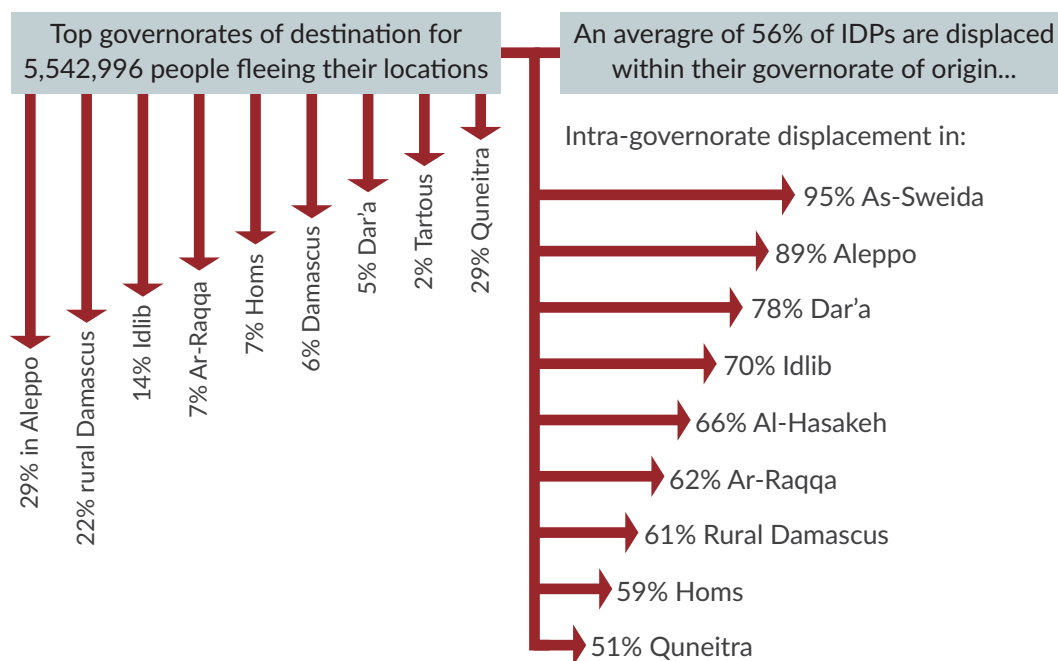
Source: International Organization for Migration, as of December 2016.
Note: IDP = internally displaced person.

Figure 2.7: Direction of Flight for the Forcibly Displaced, by Governorate

FLED INSIDE SYRIA	FLED FROM:	FLED OUTSIDE SYRIA
1,792,581	Aleppo	1,632,838
958,782	Rural Damascus	500,367
718,420	Damascus	386,006
607,943	Homs	445,223
499,878	Hama	218,288
328,308	Deir-ez-Zor	189,987
201,016	Dar'a	174,805
142,688	Idlib	179,037
90,294	Al-Hasakeh	296,942
40,372	Lattakia	178,357
102,755	Ar-Raqqa	75,597
44,550	Quneitra	17,470
13,138	As-Sweida	13,684
2,271	Tartous	7,384
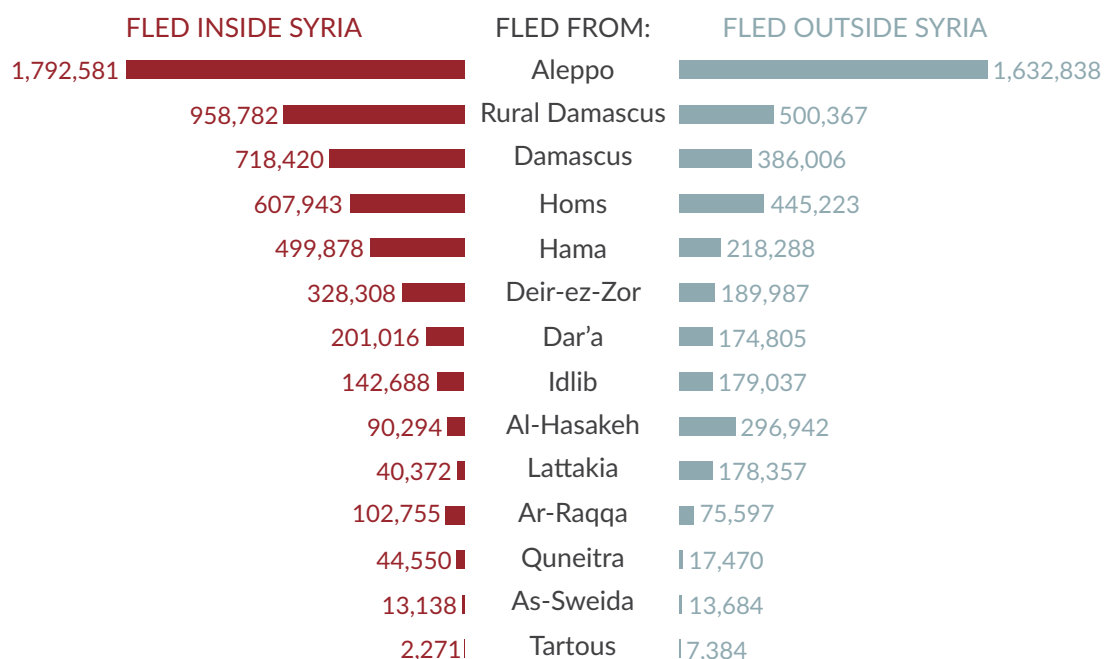
Source: International Organization for Migration, as of November 2016.

Table 2.7: Push/Pull Factor Matrix for Aleppo, Homs, and Dar'a (1: Primary Driver, 2: Secondary Driver, 3: Tertiary Driver)

Theme	Factor	Description	Aleppo		Homs		Dar'a	
			Push	Pull	Push	Pull	Push	Pull
Political Stability	Security	The perception that departure/ return is related to physical safety	1	1	1	1	1	1
	Forced relocation	Formal /informal authorities in a given area create conditions that displace populations	1		1	1	1	1
	Available shelter	Sustained access or no access to safe living space	1	1	1	1	1	1
Accessibility	Infrastructure	The extent of infrastructure damage, irrespective of service provision		2	2	2	2	2
	Access to services	The absence/presence of service provision, through public or private networks		2	2	2	2	2
	Food availability	Access to affordable food through either local markets or aid organizations	2	2	3	3	1	1
Affiliation	Economic opportunity	The prospect of generating income	3	3	3	2		3
	Kinship ties	Ethno-sectarian, religious, tribal, and/or family connections		2	1	1		3
	Partisanship	Political beliefs that serve as a reason for departure, discrimination or return		2	1	1		2

Source: World Bank 2015.
Note: 1 = primary driver; 2 = secondary driver; 3 = tertiary driver.

Although some return migration has already taken place, it remains small compared with the total numbers for displacement. So far, 566,000 returns have been reported within the country. The greatest proportion of returns occurred in Aleppo (332,000), followed by Hama (61,000). Nearly all returnees are staying in their own homes upon return (525,000 or 93 percent of the total number of returnees). The second most common shelter type for returnees is abandoned buildings, with about 20,000 returnees living in this type of shelter. Of the returnees living with host families, 16,000 live in abandoned buildings. More than 4,400 returnees report that they are paying for accommodation in their location of origin, with another 1,000 returnees in camps and formal collective centers in their home areas.

The return decision is a more complex process than departure. Displaced people often choose not to return, even with security and a political settlement in place, for a variety of reasons. In some cases, they cannot afford return travel. In other cases, especially after protracted displacement, IDPs prefer to stay in urbanized destinations for the livelihood opportunities they may offer. In still other cases, the memory of traumatic events in home areas precludes return; demographic realities have changed; shelter is unavailable or lost; or scarce resources or competing claims to land or livelihood assets make return untenable. Generally, across case studies of the criteria that regulate return decisions, the most influential factors are security, shelter, access to land and livelihood assets, restoration of basic services, and political as well as kinship affiliation considerations.

Overall, the conflict has led to significant losses in Syrian human capital in addition to imposing unsurmountable pain and suffering on Syrian people. Preliminary calculations by Hamilton and Nguyen (2017) show that the combined effects of casualties, forced dispersion, and reduced investments in human capital formation could add up to a 30 percent permanent loss in the country's human capital stock (compared with the 2010 stock).[16] To put this figure in perspective, according to the Wealth of Nations data set at the World Bank, a typical lower-middle-income country such as Syria would have about

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[16] These calculations rely on the discounted present value of the lifetime earnings of the currently employed population cohort, assumed to include individuals ages 15–65 years. Earnings within a given age and gender cohort are in turn a function of years of schooling and years of work experience. In addition to wage employment, total human capital estimates also include the earnings of the self-employed. This approach ensures that the asset value of human capital is consistent with other asset values in the System of National Accounts.

The preliminary estimates are conditional on future GDP growth, which is taken at a constant long-term growth rate of 2.5 percent, and reflects efficiency gains, after a brief period of post-conflict recovery starting from 2018. The effective discount rate for earnings is therefore the difference between an assumed discount rate and the assumed GDP growth rate. The effective discount rate used in the new World Bank estimates of human capital is 1.5%, which is consistent with a discount rate of 4 percent and real growth in per capita GDP of 2.5 percent per year.

This methodology (also called the Joregensen-Fraumeni methodology) for valuing human capital includes not only the earnings of older workers (ages 25–65), but also the expected earnings of those ages 15–24, based on school enrollment rates by age and gender. The issue for the 15–24 cohort is that many people are still in school, which has two effects on their lifetime earnings: (i) their lifetime earnings accumulation is delayed, but (ii) their earnings once employed will be higher as a result of their greater knowledge and skills. Gross enrollment rates are therefore an important input to human capital valuation, as are employment rates (by age and gender) and survival rates (also by age and gender). More details and data sources are provided in Hamilton and Nguyen (2017).

18 percent of its wealth in natural capital, 25 percent in produced capital, and 57 percent in human capital. Thus, human capital is the largest source of wealth in all regions and countries, with the exception of the large petroleum exporters, and significant losses in human capital are also significant losses in overall wealth. Unsurprisingly, labor earnings constitute at least 50-60 percent of GDP in virtually all countries. In what follows, the report will discuss the economic implications of losses in human capital as well as physical capital in more detail.

Effects of the Conflict on Economic Activity

The destruction of physical capital, casualties, forced migration, and breaking up of economic networks has had devastating consequences for Syria's economic activity. After growing by 3.4 percent in 2010, Syria's GDP was estimated by this report to have contracted by 61 percent between 2011 and 2015 and the economy was estimated to contract by an additional 2 percent in 2016 – a 63 percent decline compared to 2010 GDP.[17] The oil GDP declined by 93 percent during the same period, while the non-oil economy contracted by 52 percent due to the severe destruction of infrastructure, reduced access to fuel and electricity, low business confidence, and disruption in trade. Hydrocarbon production plunged from 383,000 bpd in 2010 to 10,000 barrels per day (bpd)[18] in 2015 and 2016, due to ISIS control of a considerable portion of the country's oil production. The most severe contraction of the economy took place in 2012 and 2013, when the economy shrank by 29 and 32 percent, respectively, as economic activity plummeted and fighting intensified and spread across the country. In nominal terms, the total GDP, which in 2010 stood at US$60 billion, was estimated to be at US$20 billion and US$15 billion in 2015 and 2016, respectively.

Syria's energy sector has deteriorated since March 2011 with oil and natural gas production declining dramatically. Syria's energy sector has encountered several challenges as a result of the conflict and subsequent sanctions imposed by the United States and the European Union. The energy infrastructure—including oil and natural gas pipelines and electricity transmission networks—has been damaged, which has hindered the exploration, development, production, and transport of the country's energy resources. Prior to the conflict, Syria's oil and gas sector accounted for approximately one-fourth of government revenue. Since the onset of the conflict, crude oil production in government-controlled areas has fallen sharply (97 percent decline), from 386,000 bpd in 2010 to 10,000 bpd[19] in 2015 and 2016, according to the United Nations Economic and Social Commission for Western Asia (UNESCWA) (figure 2.8). Total oil production,

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[17] The World Bank reference year for real GDP is 2010.

[18] This refers to oil in areas under government control, but with the fields under rebel control, oil production is estimated at 40,000 bpd.

[19] ISIS controls 80 percent of the fields; the government controls 8 percent of the fields; and Kurdish forces dominate the remaining 12 percent (Almohamad and Dittmann 2016).

Figure 2.8: Economic Activity during the Years of the Conflict

ECONOMIC GROWTH SINCE 2011

- - - Overall GDP Growth
— Non-Oil GDP Growth
— Oil GDP Growth
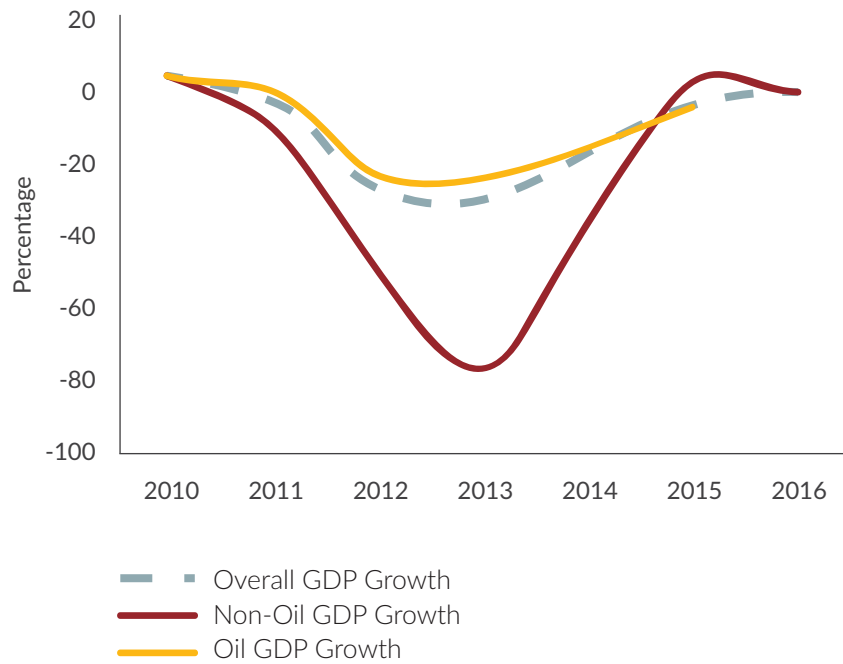
GOVERNMENT CONTROLLED PRODUCTION OF OIL
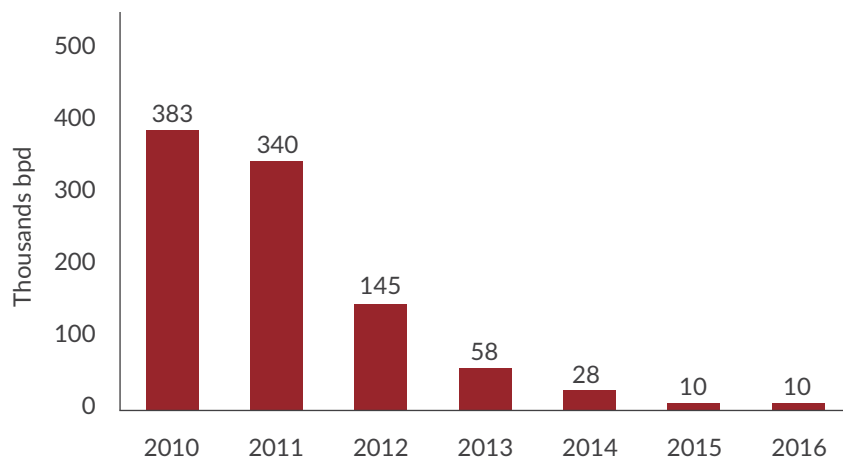
Source: World Bank staff estimates; United Nations Economic and Social Commission for Western Asia.

including from fields under opposition and ISIS control, is estimated to be up to 40,000 bpd, but estimates vary widely (box 2.2). In May 2016, the European Union extended its embargo on Syria's oil exports to Europe until June 2017, which accounted for about 95 percent of exports. Syria's official crude oil exports are assumed to have almost ceased, but evidence points toward significant illicit exports, especially from non-government-controlled areas. The capacity of its two state-owned refineries has fallen to half of pre-conflict capacity (Energy Information Agency), exacerbated by the imposed sanctions. According to the Energy Information Agency, the Islamic Republic of Iran continues to supply Syria with approximately 60,000 bpd of crude oil, but this level is still insufficient to meet demand. Until recently, the conflict has had a less severe impact on the natural gas sector than on oil, because some of the main gas fields and processing facilities have remained under government control. Syria's gas production stabilized around four to five billion cubic meters in 2013–16, down from a record 8.7 billion cubic meters in 2011. However, there is evidence that gas infrastructure has suffered significant further damage since mid-2016. In the summer of 2016, ISIS captured and destroyed Al-Shaer, one of the Syrian government's last two remaining large gas fields. In January 2017, the Al-Maher and Jihar gas field and processing plant were destroyed. The processing facility at Ebla, although currently idle, was struck by ISIS rockets in February 2017. Now only one of eight major gas processing plants remains in operation and in government control.

Agricultural production also registered significant losses. The conflict has led to widespread damage to irrigation systems and shortages of labor and inputs such as seeds, fertilizers, and fuel. Syria had been a net producer of wheat in the prior 20 years (excluding drought years) but production of this crop is currently estimated to be at 1.5 million tons, approximately 55 percent lower than the pre-conflict average of 3.4 million tons (2007–11) (FAO and WFP 2016). However, some crops, such as barley,[20] have seen an increase in production of 40 percent above the average of the past 10 years, to 0.9 million tons, following better rainfall. Syria's livestock economy, which accounted for about 40 percent of total agricultural production, was also severely affected by the conflict. According to the Food and Agriculture Organization (FAO), currently there is 30 percent fewer cattle, 40 percent fewer sheep and goats, and 60 percent less poultry (FAO and WFP 2016). Overall, agriculture GDP contracted by 41 percent between 2011 and 2015, and this followed a 10 percent decline in 2010.

Conflict-driven disruptions of irrigation systems and labor shortages have played important roles in the loss of agricultural output. The FAO Food Security Study reported that because of the damage to pumping stations (both for surface and groundwater irrigation), irrigation structures, and equipment, and the poor availability of electricity and fuel, many farmers have

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[20] A rainfed and more resistant crop under adverse weather and input conditions and not dependent on irrigation and fertilizers like wheat is.

abandoned irrigation and turned to predominantly rainfed crops such as barley, coriander, and other herbs. A pilot study conducted for this report in four agricultural zones in Syria supports these observations (box 2.3). The availability of farm labor during the 2015/16 season varied greatly across governorates, based on security conditions and availability of alternative employment. According to respondents to the NAPC survey, in Hasakeh, the low availability of farm labor contributed to the collapse of cotton production, which is now reduced to 4,000 hectares.

Box 2.2: Oil Production by Non-State Groups

In areas outside government control, non-state groups have continued to extract and process oil and gas. Estimates from November 2014 suggest that ISIS was producing, refining, and selling as much as 50,000 barrels of crude oil per day. Another estimate from October 2015 puts the number at between 34,000 and 40,000 barrels a day. The coalitions led by the United States and the Russian Federation against the Islamic State (ISIS) consider oil production a "war-sustaining activity," and have therefore targeted extraction, refining, and transport infrastructure across ISIS-held territory. By late September 2016, the United States–led coalition claimed to have struck 2,638 "oil infrastructure" targets, primarily in Syria, leaving much of the country's extraction and processing capacity destroyed (though much had reportedly already been damaged by previous fighting). See map B2.2.1 and table B2.2.1.

Map B2.2.1: Oil Economy during Conflict
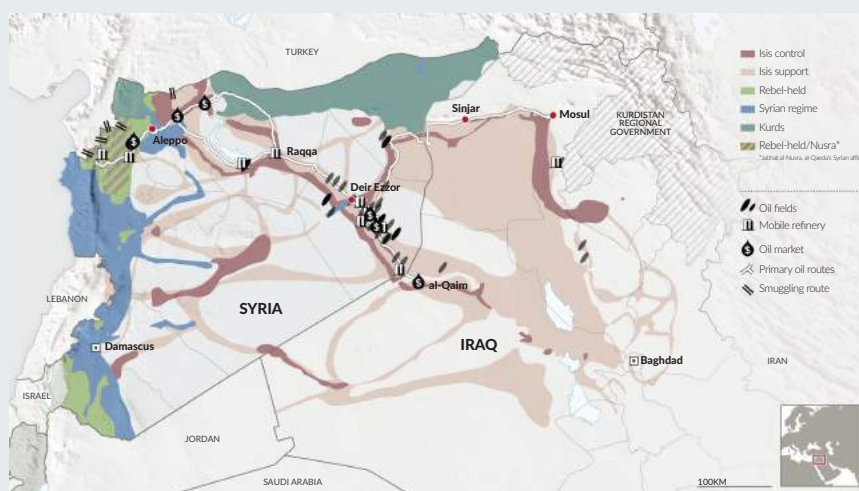
Source: Erika Solomon, Robin Kwong and Steven Bernard, at Financial Times, February 29, 2016.

Notes: Military map changed substantially since the time of this analysis: ISIS lost ground including the al-Jabseh field to the Syrian Democratic Forces.

Box 2.2 (cont.): Oil Production by Non-State Groups

Table B2.2.1: Sample of ISIS Crude Oil Production

Oilfield	Est. production (barrels per day)	Price ($/barrel)
al-Tanak	11,000-12,000	$40
al-Omar	6,000-9,000	$45
al-Tabqa	1,500-1,800	$20
al-Kharata	1,000	$30
al-Shoula	650-800	$30
Deiro	600-1,000	$30
al-Taim	400-600	$40
al-Rashid	200-300	$25

Source: Erika Solomon, Robin Kwong and Steven Bernard, at Financial Times, February 29, 2016.

By 2015, the Assad government retained control of only 8 percent of Syria's oil resources (Ar Rasm, Bilas Sharifah, al-Sha'ir, Elba, and Jazal fields). The oil fields held by the Islamic State group in the summer of 2015 had a pre-conflict output of 250,000 barrels per day (bpd)—or roughly 65 percent of the country's overall capacity. Syria's Kurdish-led factions also control oil fields, most notably the Rmailan field in Hasakeh province. The field, which at its height produced up to 170,000 bpd, in late 2015 operated at about 15,000 bpd.

Syria's two state-owned refineries in Baniyas and Homs are also only partly operational: by early 2015, the nominal capacity was just below 240,000 bpd or 75 percent of the country's pre-conflict demand. Syrian officials claimed that infrastructure damage has further decreased production capacity to about 50 percent. Under conflict conditions, civilians and armed groups have also set up private makeshift oil refining sites across the country. For a 2016 report entitled "Scorched Earth and Charred Lives," the Dutch NGO PAX used satellite data to identify as many as 37 separate makeshift oil refining sites across Syria, each with hundreds or even thousands of very rudimentary individual structures to process oil that reportedly has been primarily purchased by armed groups in the areas. The central government reportedly continues to purchase oil from such areas.

There has been considerable destruction of major industrial zones in Syria, most notably in Aleppo. Many Syrian cities had clearly demarcated industrial areas and, in some cases, industrial zones a short distance from the city. In Aleppo, which was the manufacturing center of Syria and a hub for sectors including pharmaceuticals, textiles and garments, chemicals, and

agroprocessing, many of the industrial zones were the scene of substantial fighting and have suffered major damage. As table 2.8 shows, the worst hit zones in Aleppo have seen 70 percent or more of their buildings damaged, according to recent satellite imagery. Furthermore, this imagery does not capture lateral damage to the sides of buildings and looting.

Manufacturers were forced to close their businesses or move them elsewhere. In 2013, the government published a directive to encourage factories to move to safe cities and simplified the paperwork required to do so. In 2014, they took a decision to establish two new industrial zones in Latakia, with sizes of 350,000 and 225,000 square meters, respectively. In interviews, private Syrian banks reported that lending for factory relocation and setting up in safe cities like Latakia and Tartus is a significant line of business. However, other manufacturers have moved their production elsewhere in the region, such as Turkey, Egypt, and Jordan. Egypt in particular has attracted the garment and textile business from Aleppo. But not all sectors have been equally able to move outside the country. Machines from heavier industries, and even some machines in textile production, were simply too cumbersome to move and had to be abandoned. The Syrian government initially reacted to businesses moving outside the country by banning them from selling their products back into Syria. However, the government is now attempting to attract back businesses that relocated overseas.

Sanctions have also had a significant impact on the manufacturing sector. This impact has been most severe in sectors that export, require a substantial share of imported inputs, or were closely linked to external partners who have cut ties. For exporters, none of the interviewed private banks reported that they were providing any foreign currency services or letters of credit, due to the sanctions. State-owned banks are similarly affected and in many cases directly sanctioned for their links to the government. As a result, accessing import and export finance is one of the biggest challenges facing manufacturers, according to interviews with manufacturing conglomerates. Many of these conglomerates suffered physical damage to facilities as well, but today are more worried about the ongoing impact of sanctions. Trade financing is occurring largely through informal methods, but this undoubtedly limits its accessibility.

Box 2.3: Effects of the Conflict on Syrian Agriculture: A Pilot Study

A pilot study, conducted jointly by the World Bank and the European Space Agency EO4SD for this report, used Satellite Earth Observation to assess the impact of the conflict on agricultural production in Syria. The study mapped temporal and spatial changes in land cover and agricultural productivity, by using a vegetation index, which is a measure of the greenness of vegetation. Three areas and respective irrigation schemes in Syria, located near Dara'a, Aleppo, and Ar Raqqah, were compared with similar schemes in nearby zones in Turkey and Jordan. The status of these agricultural areas is assessed and compared between 2011 (pre-conflict) and 2016 at field level (10x10 meter to 30x30 meter resolution). (See maps B2.3.1 and B2.3.2.)

Box 2.3 (cont.): Effects of the Conflict on Syrian Agriculture: A Pilot Study

Map B2.3.1: Study Areas Included in the Demonstration

Map B2.3.2: Change in Vegetation Cover for February in March (Al Hassakeh) from Pre-Conflict in 2011 to Conflict in 2016

Source: World Bank and European Space Agency staff calculations.

The main conclusion is that the conflict has affected agricultural output through land utilization, cropping intensity, and crop yields. Cultivated land has decreased by about 50 percent in the Syrian Al Eis irrigation scheme; formerly wet (potentially irrigated) areas in the dry season diminished by 36 percent; and productivity has declined by 36 percent in winter and 47 percent in summer. In Ar Raqqah, productivity also decreased in spring and summer, by on average 15 percent. In Al Hassakeh, productivity decreased by 15 percent in summer but increased by 60 percent in spring. The results include targeting criteria and an agricultural activity analysis, and can assist in planning for reestablishing agriculture input supply chains.

Agricultural production capacity is influenced by three variables: land utilization (extent of cultivated areas), cropping intensity (number of crop cycles in a year), and crop yields (productivity). Earth observation can provide information to support all three variables. However, in an Earth observation context, the word productivity is a combined measure of all three effects, derived by a vegetation index, here the Normalized Difference Vegetation Index. The extent of cultivated areas significantly decreased in the Al Eis irrigation scheme (45,672 hectares) between 2011 and 2016. Although pre-conflict there were 34,327 hectares under cultivation, less than half of the area was still in use in 2016 (12,308 hectares).

A detailed classification of the cultivated area in Al Eis shows that half of the El Ais area was fallow or abandoned in 2016, compared with the cultivated area extent in 2011. The detailed classification of the cultivated area in Al Eis shows that in 2016 the remaining active cultivations were mainly winter crops (11.5 percent), followed by spring crops (10.9 percent). Summer crops, which typically need irrigation, are only found in 3.9 percent of the Al Eis area. Two cropping cycles are rarely found in 2016. Earth observation showed that vegetation activity was not present or in general significantly lower in the Syrian irrigated area compared with an intact irrigation scheme in Turkey in 2016. Furthermore, the crop cycle and in particular the start of the season was very similar to the surrounding natural, rainfed vegetation in the Syrian Al Eis irrigated area, indicating a breakdown of the irrigation infrastructure.

Table 2.8: Damage by industrial area in nine cities

City	Industrial area	Damage (%)
Aleppo	Shaykh Najjar	81
Aleppo	Ramouseh	73
Aleppo	Ash-Shaqif	70
Aleppo	Billeramoun	67
Deir ez-Zor	Deir ez-Zor	54
Tadmur	Tadmur	43
Kobani	Kobani	39
Idlib	As-Sina'iyya	34
Aleppo	Jibreen	18
Dar'a	Dar'a	8
Raqqa	Raqqa	4
Douma	Douma	3
Hama	Hama 2	3
Hama	Hama 1	1

Source: World Bank staff estimates.

On the expenditure side, the conflict has led to a collapse in investments (figure 2.9). Public and private investment in Syria contracted greatly after the start of the crisis, due to the heightened level of risk and uncertainty and the severe damage to infrastructure, equipment, electricity, water systems, and communications. There was a 24 percent cut in public investment in 2011, and a contraction of over 31 percent in 2015 in real terms. Investors exited Syria due to the insecurity and poor business environment, which led the private investment's share of GDP to decline from 12 percent in 2010 to 4 percent in 2015. Public investment's share of GDP was also severely hindered by declining revenues and shifting priorities toward military consumption and public wages. Overall, the period from 2011 to 2015 witnessed a substantial fall in public investment, from 9 percent of GDP in 2010 to only 1 percent of GDP in 2015.

International trade, especially exports, also declined severely (figure 2.9). Total exports fell from US$7.9 billion in 2011 to US$631 million in 2015, a decline of 92 percent in just four years. Imports declined from US$17,348 million in 2011 to US$4,654 million in 2015—a 73 percent fall. The steeper decline in exports than imports (and GDP) is potentially driven by three factors: tradable sectors, for example, oil, could be more exposed to changes in income than non-tradable sectors; sanctions on Syrian exports could be effectively blocking activity; and some export industries may have substituted away from formal exports to production for domestic consumption, while

Figure 2.9: Investment and Trade Dynamics

PRIVATE AND PUBLIC INVESTMENT

Private fixed capital formation
Public fixed capital formation
Total fixed capital formation
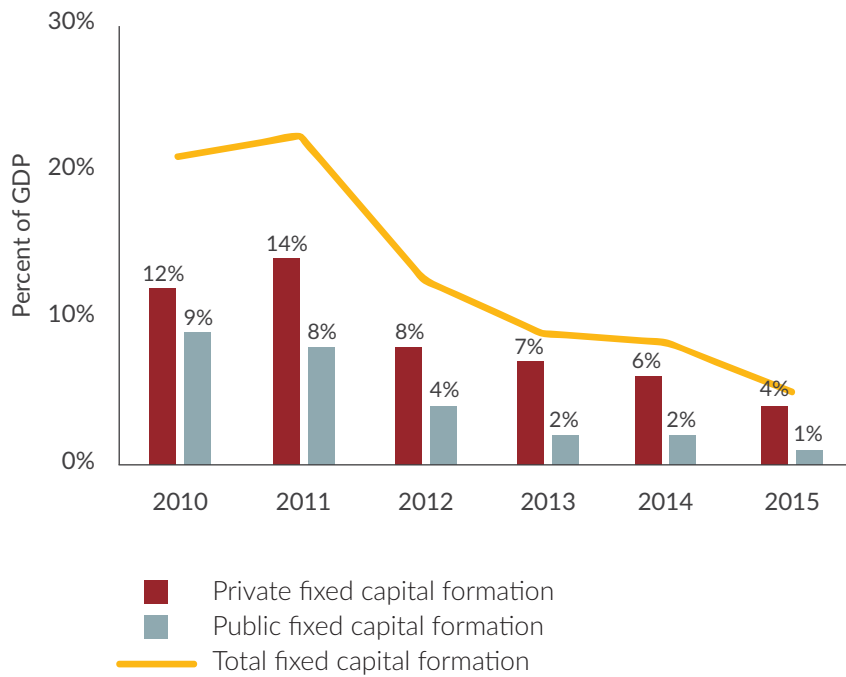
EXPORTS AND IMPORTS IN SYRIA BETWEEN 2011 AND 2015, USD MILLIONS
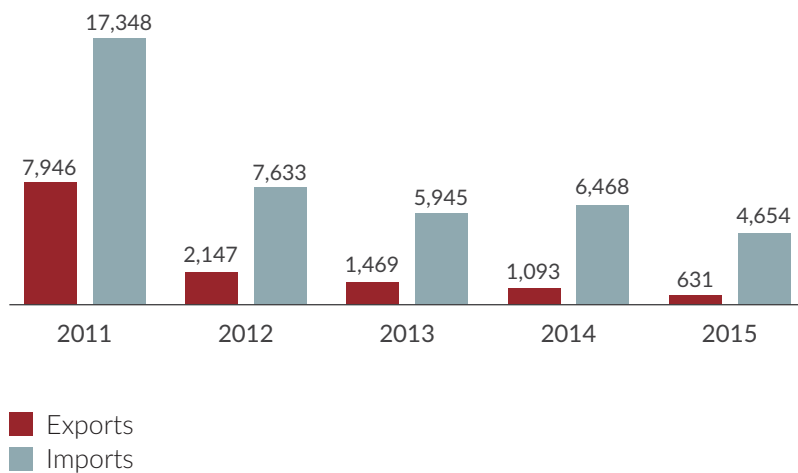
Exports
Imports

Source: World Bank staff estimates.

others may have engaged, directly or indirectly, in illicit trade. The mineral sector's exports suffered the most dramatic declines (from US$4.7 billion in 2011 to close to zero in 2015). On the import side, the decline in manufactured goods imports (from US$11.5 billion in 2011 to US$2.8 billion in 2015) explained two-thirds of the total reduction in imports.

Foreign exchange reserves are almost depleted. With conflict and international trade sanctions, the current account deficit was estimated to reach 28 percent of GDP in 2016, up from 0.7 percent of GDP in 2010. This was due mostly to the collapse of oil exports, loss of tourism revenues, and sanctions. The government has been increasingly financing its growing external deficit through withdrawals from the Central Bank reserves. It is estimated that the amount of foreign reserves declined severely, from nearly US$21 billion in 2010 to less than US$1 billion in 2015.

Public Finance

The conflict has led to an escalating budget deficit, especially after 2012, when state revenues began to plummet. Lower revenues and high military spending sharply widened the fiscal deficit to 9 percent of GDP in 2016, from 2 percent of GDP in 2010 (UNESCWA). However, underlying fiscal developments were much more adverse than suggested by the changes in the budget deficit: total public revenue dropped from 23 percent of GDP in 2010 to less than 3 percent of GDP in 2015. This was mainly due to the losses in oil and tax revenues, the collapse of international trade due to sanctions, a growing informal economy, and weak administrative collection capacity. In response to this shortfall, government spending was cut back, but these measures were not enough to offset the fall in revenues (figure 2.10).

The conflict has led to a shift from capital expenditure toward current expenditure. Capital expenditures collapsed from about 9 percent of GDP in 2010 to an estimated 1 percent of GDP in 2015. Current expenditure, as a percent of GDP, was much higher, at 18 percent in 2015, compared with 16 percent of GDP prior to the crisis, reflecting increased spending on public sector wages, military, and imports of essential goods. Wages made up the largest share of current expenditure, followed by subsidies and transfers, goods and services, and interest payments.

Current expenditure on wages held steady and public debt increased to an unsustainable level. Although on the decline in recent years, current expenditures have continued to account for the largest share of the budget despite the collapse in revenue over the course of the conflict. Wages made up the largest share of current expenditure, followed by subsidies and transfers, goods and services, and interest payments. As a result, public debt has increased to unsustainable levels, driven by the collapse in revenue and increase in expenditure, particularly for military purposes. Public debt is estimated to have increased by 150 percent of GDP in 2015 (US$21 billion), up from only 30 percent of GDP in 2010 (US$18 billion) (figure 2.10).

Figure 2.10: Fiscal Deficit and Debt

FISCAL BALANCES

- Total revenue
- Total expenditure
- Budget deficit
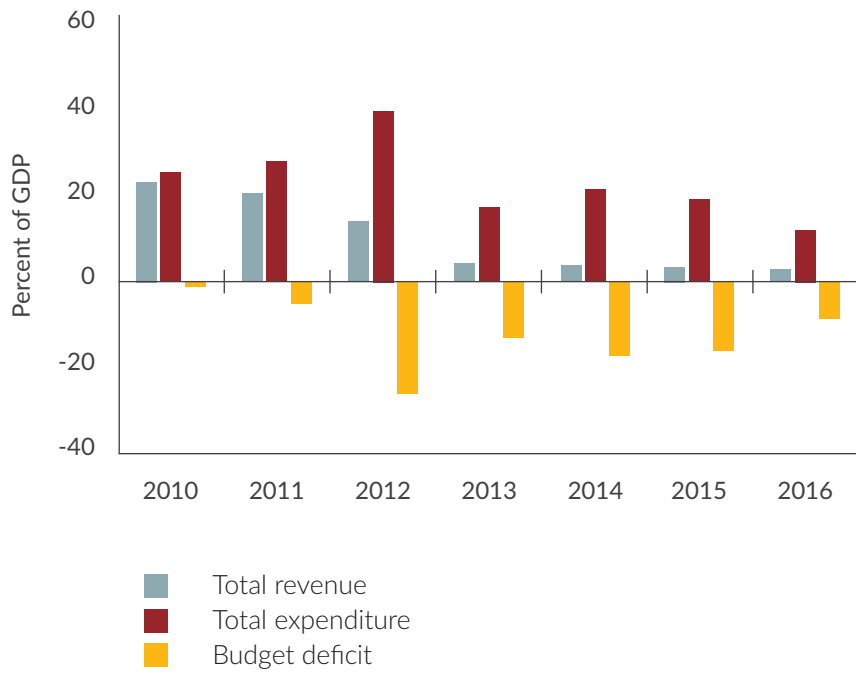
GROSS PUBLIC DEBT
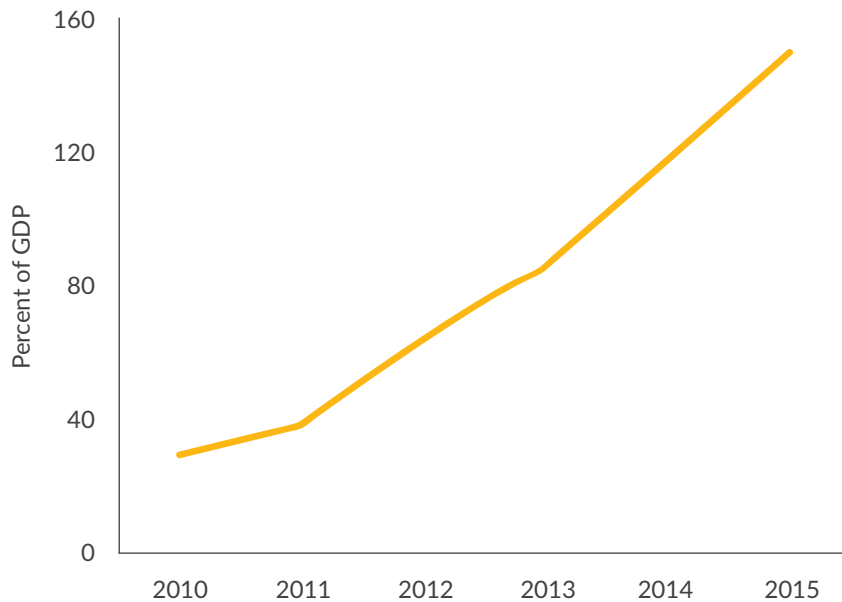
Source: United Nations Economic and Social Commission for Western Asia and International Monetary Fund estimates.

Money and Banking

The nominal exchange rate of the Syrian pound sharply depreciated. Prior to March 2011, the Syrian pound was stable and traded at LS 47 against the U.S. dollar. With depressed export revenues and declining international reserves, between 2010 and 2015, the official exchange rate of the Syrian pound depreciated by 459 percent and reached 260 (LS/US$). The Central Bank of Syria (Syria Central Bureau of Statistics) took several measures, including limits on import licenses, to curtail demand for foreign currency. Other measures included forcing exporters to surrender their foreign currency earnings in April 2015. However, the ability of the Syria Central Bureau of Statistics to intervene effectively has proven limited, considering the continuous depletion of foreign currency reserves. The Syrian currency continued its depreciation against the U.S. dollar during 2016, but at a much sharper pace. Foreign currency shortage and ongoing devaluation led to increasing dollarization in government-controlled and opposition areas.

The conflict also led to a steep increase in prices. The consumer price index (CPI) in Syria has increased rapidly throughout the period of the crisis. According to UNESCWA, the prices for products such as rice, subsidized bread, and wheat flour rose dramatically, by 723 percent, 418 percent, and 388 percent, respectively, between March 2011 and November 2015. In October 2014, the government raised the subsidized price of diesel from 36 to 48 cents per liter. The price of heating oil increased from 73 to 85 cents per liter. Higher costs for rent and utilities put additional pressure on purchasing power. In 2016 only, CPI inflation was estimated to have reached to 58 percent, due to ongoing disruption of trade, large shortages in supply, and the sharp depreciation of the Syrian pound (figure 2.11). However, the actual inflation rate varies significantly across the country, reflecting the fragmentation of Syria's economic space, with significantly higher price hikes in areas with more intense conflict. Although prices are less volatile in government-controlled areas (Latakia, Tartous, and Damascus), they are particularly rampant in areas with high security risks or besieged areas (such as Deir-Ez-Zor and Ar Raqqa), where the trade disruptions and security risks increased the value of goods associated with high transportation costs.

Syria's financial sector has been hit hard by a shrinking economy, tightening international sanctions, lack of public and private investments, and reduced business opportunities in a conflict environment. The banks have endured physical destruction of branches, but all 20 banks are still operational. Private sector banking and payments systems appear to be largely functional in the key government-held areas. There, deposit and withdrawal services have continued, with limited lending services. Automated teller machine (ATM) and branch networks have deteriorated, but are still functional in government-held areas, although card payment transactions are not available. Communication failures periodically affect inter-branch connectivity and ATM services. Moreover, the security of staff and branches has become a major

Figure 2.11: Exchange Rates and the Consumer Price Index

OFFICIAL AND PARALLEL EXCHANGE RATES IN SYRIA

INFLATION AS MEASURED BY CONSUMER PRICE INDEX
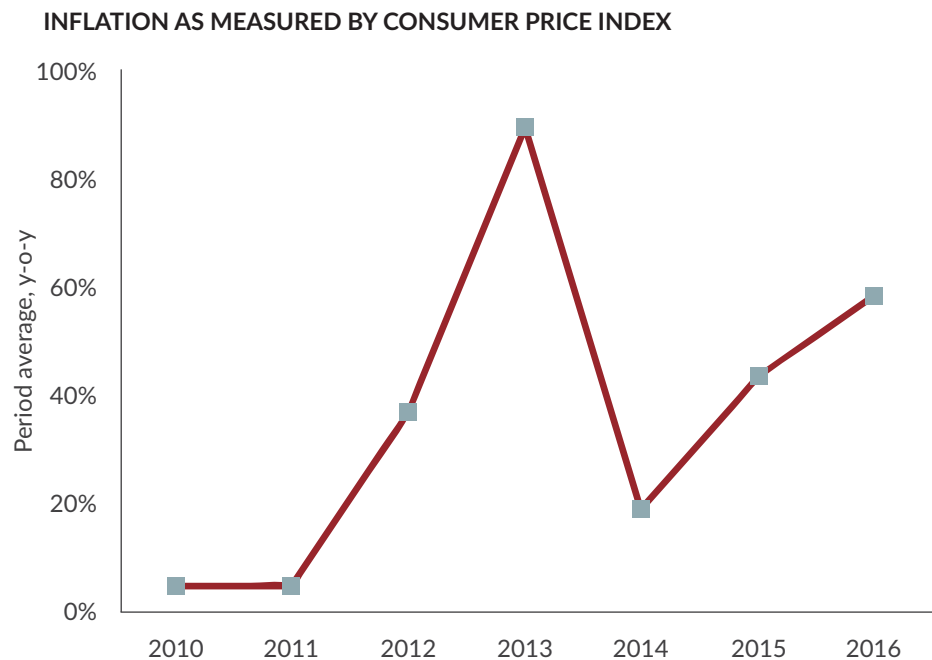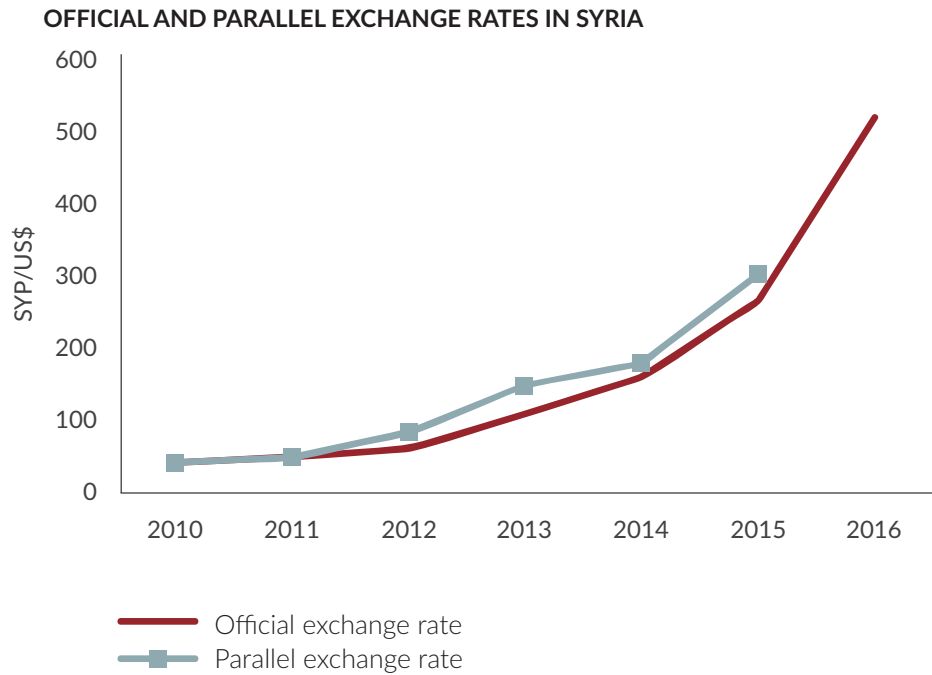
Source: International Monetary Fund and United Nations Economic and Social Commission for Western Asia estimates.

concern for the banks. Branches have been subject to armed robberies, and the ones in the conflict regions have had to close.[21] As early as December 2013, it was estimated that 30 percent of the 539 bank branches (243 private and 296 public bank branches) were destroyed or not operational (Badra 2015).

In nongovernment areas, access to and functioning of basic banking and payments systems is much more limited. Private banks are unable to operate where the central bank does not have authority. As such, it appears that no private bank branches are open in rebel-held areas. However, several private banks noted that in the northeastern city of Al-Qamishly, which is partly held by Kurdish groups, branches of private Syrian banks remain operational, thanks to some form of agreement between Kurdish groups and the government. Outside of this, rebel, Kurdish, and ISIS-held areas have none of the formal banking services they previously enjoyed. The economy in these areas appears to be almost entirely cash based.

In this challenging environment, banks have had difficulty finding lending opportunities within acceptable risk parameters. According to International Monetary Fund data,[22] lending to the private sector constituted around 45 percent of bank lending in 2010. Thus, the collapse of the private sector could have substantial impact on bank income levels. World Bank[23] data indicate that the net interest margin of the banking system declined from 2.7 to 1.8 percent from 2011 to 2013, while the share of noninterest income in total income rose from 44.5 to 84.1 percent. In the absence of credible banking sector data, particularly from the predominant public sector banks, it is very difficult to assess accurately the impact of the conflict on the banking sector.

International sanctions have compounded the effect of the conflict on the banking and financial sector. Between 2011 and 2015, international sanctions cut off the Syrian Central Bank (SCB) and state banks (representing 75 percent of banking assets) from international debt markets and payment and settlement systems. Bank for International Settlements data show that the exposure of foreign banks to Syrian banks declined from around US$550 million to US$90 million between 2011 and 2015. Despite budgetary problems and the need to attract foreign direct investments, Syria failed to attract any private financial flows from abroad. The only official financial assistance was provided by the Iranian government in the form of credit lines, totaling US$1.9 billion in 2013, US$3 billion in 2014, and US$0.97 billion in 2015 (IMF 2016). Assuming that the Iranian credit was the only financial aid (with no assistance from the Russian Federation or China) the remaining budgetary deficit was probably funded by the SCB and commercial banks, thereby negatively affecting the banking system.

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[21] In the absence of credible financial soundness indicator data, the team is unable to provide a more robust assessment of the impact and damage to the financial infrastructure of the banking sector.
[22] International Monetary Fund International Financial Statistics database.
[23] World Bank Global Financial Development Database.

The nonbank financial sector was hit hard, but enterprises largely continued to operate. The Syrian stock market (DSE) is still operational, with a few investors, and has had no de-listings from the exchange. As of 2015 Q4, DSE had 23 listed companies with US$7 billion in total assets, almost all from the banking and insurance sector. As of 2015, six brokerage firms of 13, and four advising firms have discontinued their operations due to the downturn in DSE's performance and lack of proper income opportunities (Badra 2015). The insurance sector suffered from increased claims. The conflict saw an increase in claims, which worsened the financial position of insurance companies, despite the rejection of many claims on the basis of noncoverage. The insurers have also had difficulty finding reinsurers, due to sanctions and high country risk, while rising reinsurance costs were partly passed onto clients. Moreover, lower incomes of the population and high costs of insurance services hit the demand for insurance products. This is also visible in the DSE data, which show that the assets of the listed insurance companies are down from US$269 million in 2011 Q1 to US$95 million in 2015 Q4.

Despite the conflict and having to write off part of their loans, certain Micro Finance Institutions (MFIs) are continuing operations: the Aga Khan Foundation has continued microfinance operations in Syria, although scaled down to rudimentary levels. It also collaborated with local organizations on aid distribution, such as cash assistance through savings accounts. Ibdaa MFB resumed activities in Syria and is working on opening new branches. The United Nations Relief and Works Agency provided 30 percent of total microfinancing in Syria in 2012 and granted 9,334 loans worth US$2.6 million in 2015.[24] By 2015, it had to write off 8,648 loans with an uncollected balance of US$318,145.[25]

Human Development Outcomes

Economic deterioration hit employment. Since the onset of the conflict, jobs were destroyed at an estimated rate of approximately 538,000 per year on average[26] between 2010 and 2015, adding 482,000 people to the unemployment pool every year. The working age population has also decreased by 2 percent annually, corresponding to an estimated decrease of 264,000 individuals net per year in that period. As a result, the labor force decreased by 1 percent, about 56,000 individuals net per year, annually (figure 2.12). Overall, the unemployment rate increased from 8.6 percent in 2010 to a disastrous 52.9 percent in 2015, a 44.3 percentage point change.

Idleness and informality have become the norm. More than three in four Syrians of working age (77 percent, or nine million individuals) are not involved in any economic value generation: 2.9 million unemployed and 6.1 million

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[24] www.UNRWA.ORG.
[25] www.UNRWA.ORG.
[26] The difference between the number employed in 2015 and 2010 would determine the number of net jobs created (or destroyed in this case). This number is "net" as it includes jobs created and destroyed.

inactive (figure 2.13). Unemployment among youth reached 78 percent in 2015 (UNESCWA 2016). The current inactivity in the working age population will have long-term consequences, including rapidly depreciating skills and human capital. In the short term, however, the consequences are dire: individuals, especially young men, are increasingly joining the military or getting involved in violence to survive (SCPR 2014). Those who are lucky enough to find a job turn to informal job opportunities (as a wage earner or self-employed) or become involved in the "war economy" as a coping mechanism in an effort to earn an income for their families (World Vision 2016). These jobs are mostly labor intensive, unskilled, or low skilled and poorly paid. Even those employed in relatively stable jobs or in the private sector have seen their living conditions decline steeply due to the rise in the prices of basic commodities and rapidly depreciating currency.

Demographic mobility helped to adjust the distribution of economic activity. The conflict pushed people and economic activities away from conflict zones into relatively more stable and safer ones. With millions of IDPs moving from high-conflict intensity areas, like Deir Ezzor and Dara'a, to low-conflict intensity areas, like Tartous and Lattakia, the former experienced labor shortage and the latter labor surpluses. With saturation in the labor market and the associated depression in wages (FAO and WFP 2015), the relatively safe areas became attractive to businesses and investments. According to Dun & Bradstreet (2016), citing data from 2015 from the Syrian Investment Agency, the regions of Suwayda and Tartus emerged as the most dynamic investment areas in 2015, as they attracted almost 70 percent of all new investments for 2015. These two regions were not considered particularly attractive before the onset of the conflict in 2010; they attracted only 11 percent of overall investments. By contrast, households in Aleppo and Dara governorates have lost more jobs than any other parts of the country (UNESCWA 2016). The emigration of people abroad, due to the security situation, lack of job opportunities, and steep decline in the standard of living have led to an important skills shortage in Syria.

Since the onset of the conflict, the government has scaled down its social security programs to cope with mounting fiscal pressures. With declining revenues, the government decided to reduce its expenditures, first by dramatically decreasing spending on subsidies. This led to a significant increase in the prices of basic food and fuel. In October 2013, manufacturers started paying market prices for fuel oil and "mazout" or gasoil, effectively ending a decades-old policy of subsidies that followed the arrival to power of the Baath party. Key staple products (rice and sugar), fuel oil, and "mazout" are still subsidized for households, but prices have risen significantly. Prices of "mazout" increased about nine-fold and that of fuel oil increased 10-fold from 2011 to 2015. As for rice and sugar, prices increased by 2.3-fold in the same period. In an effort to reduce expenses for households, those key staple foods are still subsidized under a coupon scheme; however, the loss of jobs, prevalence of violence, and reduction in subsidies have led to poverty descending rapidly on the Syrian people.

Figure 2.12: Labor Market Indicators: Pre-Conflict versus Conflict

CHANGE IN THE SIZE OF THE LABOR FORCE, EMPLOYED AND UNEMPLOYED

Conflict period

Change in the number of unemployed
Change in the number of employed
Change in the size of the labour force (right-axis)
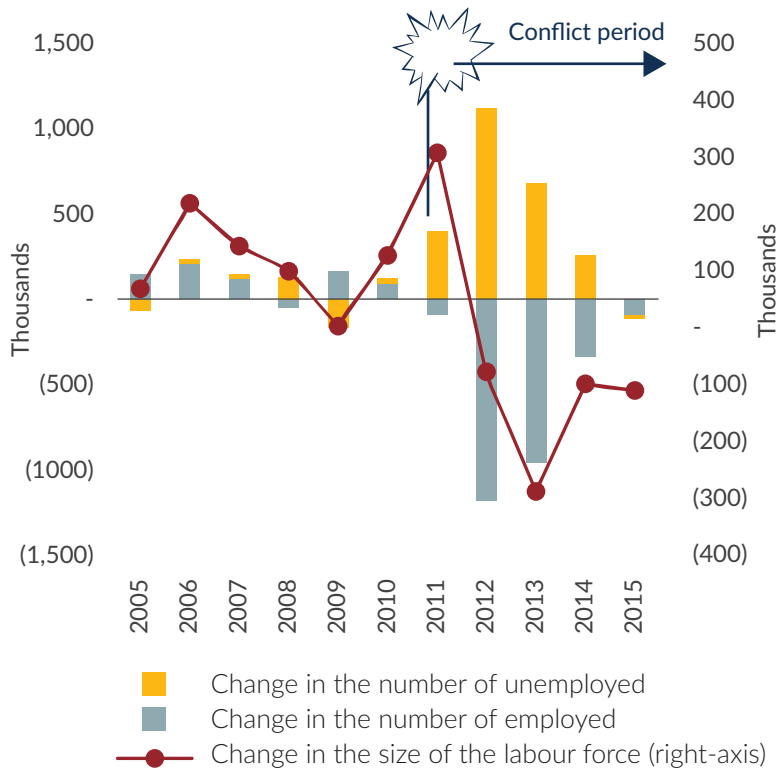
Source: World Bank staff estimations.

ANNUAL GROWTH AND PERCENTAGE POINT (PP) CHANGE IN KEY LABOR MARKET INDICATORS

Unemployment rate (pp change)   44.3%
                                     0.5%

Total population (annual growth)   -2.2%
                                     2.7%

Working age population (annual growth) -2.1%
                                        2.6%

Unemployed (annual growth)   49.2%
                                     5.1%

Employed (annual growth)   -12.8%
                                     2.0%

■ Post-crisis (2010-2015)
■ Pre-crisis (2005-2010)
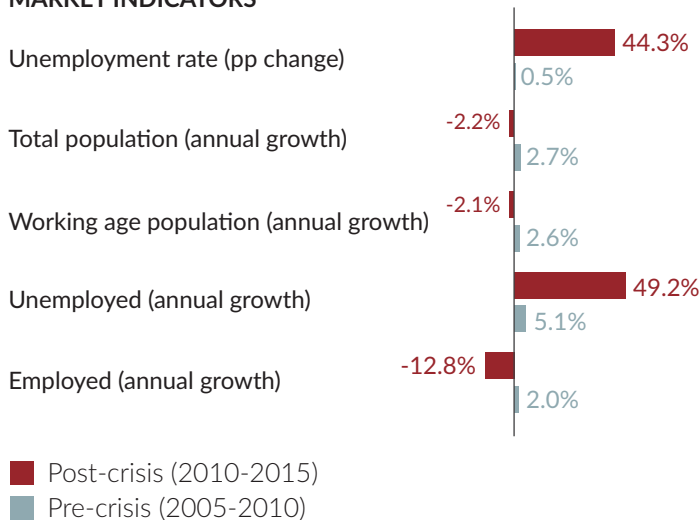
Source: World Bank staff calculations based on data from the Syrian Center for Policy Research.

Figure 2.13: Structure of the Working-Age Population in Syria, 2015

Working age population 11.6million 62.9%		
Inactive 6.1million 52.8%	Active 5.5million 47.2%	
	Employed 2.6million 47.1%	Unemployed 2.9million 52.9%
Agriculture 0.4million 16%	Industry 0.02million 1%	Building & Construction 0.4million 16%
Trade & Tourism 0.5million 19%	Transportation & Communications 0.2million 7%	Other services 1.1million 41%
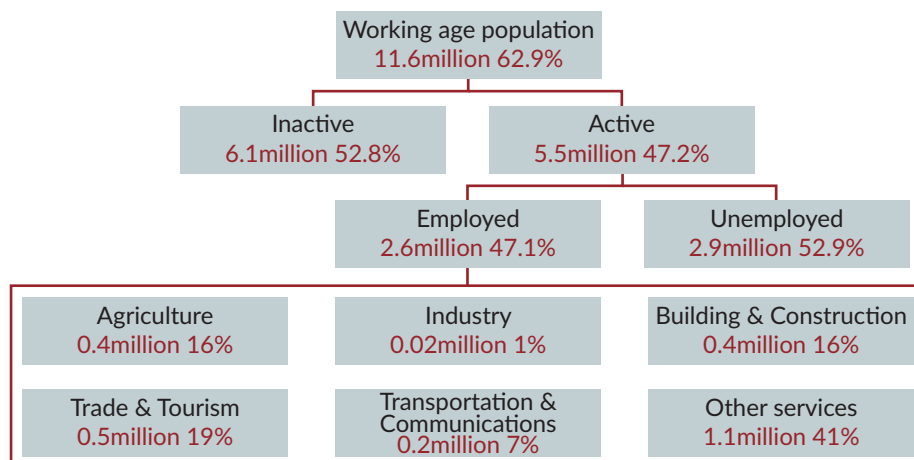
Source: World Bank staff estimations.

Estimates suggest that about six in 10 Syrians live in extreme poverty today. Micro-data on per capita expenditure at the household level and the poverty line were not available for this exercise. Nevertheless, a simple extrapolation of the growth elasticity of extreme poverty (from 2004–07) suggests drastic increases in extreme poverty in Syria (figure 2.14). Assuming that the estimated growth elasticity remains constant at -2.911 throughout the crisis period and that inequality does not increase (scenario 1), the poverty rate in 2016 is estimated to be 66.5 percent. When we allow the income elasticity to fall as the poverty rate increases, it moderates the impact of falling income on poverty; the estimated poverty rate under scenario 2 is 54.5 percent. Finally, when we assume that elasticity is decreasing and the Gini index is increasing at the rate of 1 percent per year (scenario 3), the predicted extreme poverty rate in 2016 is 62.7 percent.

Aid distribution statistics support the assessment of a rapid increase in poverty rates. The United Nations Office for the Coordination of Humanitarian Affairs estimates that about nine million people are in need of food assistance in Syria today (UNOCHA 2016). About seven million people, or one in three individuals, are food insecure, and an additional two million people are at risk of falling into food insecurity. The entire population of besieged locations, and over half of all IDPs, are considered food insecure. According to OCHA, 74 percent of the sub-districts in Syria reported members adopting, on average, more than five types of negative coping mechanisms, to access food. Some of the negative coping mechanisms reported were early marriage, begging, borrowing, child labor, and child recruitment in the conflict. These negative coping mechanisms are disproportionately affecting women and children (UNOCHA 2016).

Figure 2.14: Simulated Poverty Rate With and Without the Conflict, 2007–16 (%)
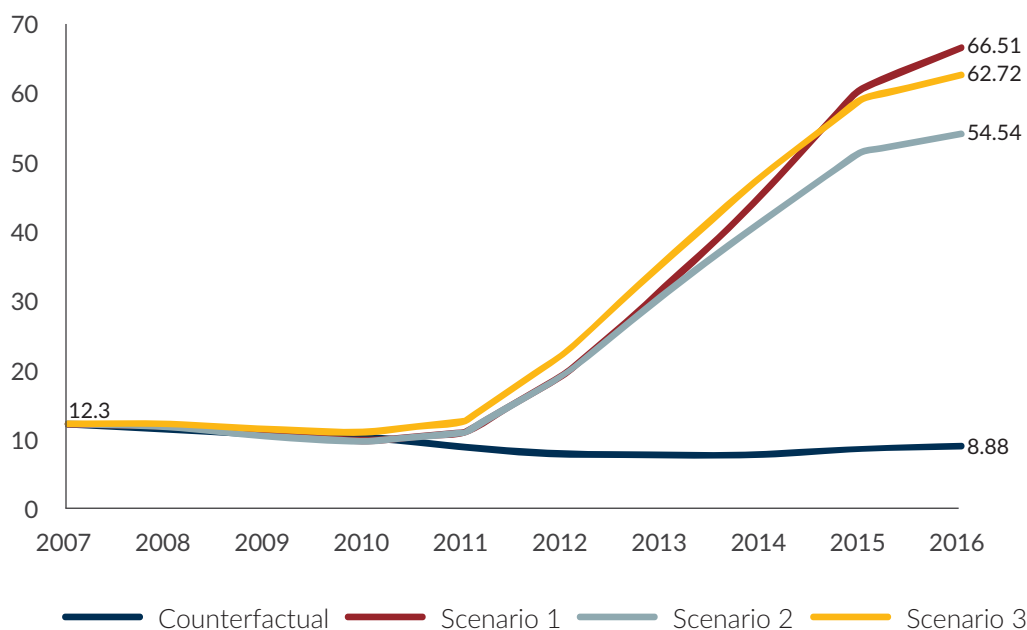
Food security is the biggest item in aid. Since the onset of the conflict in early 2011, US$3 billion, representing 50 percent of earmarked official aid flows or 32 percent of all official aid flows to Syria have been assigned to the food security sector (figure 2.15). Of all sectors, food security is the biggest recipient of aid, followed by the health and the "emergency shelter and nonfood items" sectors (US$774 million and US$591 million, respectively). The amount of official aid labeled as going to food security might be underestimated, as aid flows marked as multi-sector and for which a sector has not yet been specified include food security. Aid earmarked for the food security sector as a share of yearly aid flows has been stable, at around 33 percent on average between 2012 and 2016. Over 60 percent of the abovementioned food assistance is channeled through the World Food Program (WFP).

Foreign aid to Syria grew at an annual growth rate of 131 percent between 2011 and 2016, with the majority of the earmarked sources originating from the Government of the United States. Funds to Syria grew from US$39 million in 2011 to US$2,584 million in 2016 (figure 2.16). Of those funds, 23 percent originated from the Government of the United States, 21 percent of the Government of Germany, and 12 percent each from the European Commission and the Government of the United Kingdom, in 2016. Other donors included the Turkey Humanitarian Fund (accounting for 4 percent of total funds in 2016), Government of Kuwait (accounting for 5 percent in 2015 and 2016), Government of the United Arab Emirates (accounting for 9 percent

in 2014), Government of the Kingdom of Saudi Arabia (accounting for 33 percent in 2013), as well as the Governments of Sweden and Switzerland (accounting for 10 percent each in 2011).

Figure 2.15: Food and Non-Food Foreign Aid Flows in Syria

TRENDS IN FOOD ASSISTANCE TO SYRIA, 2011-2016
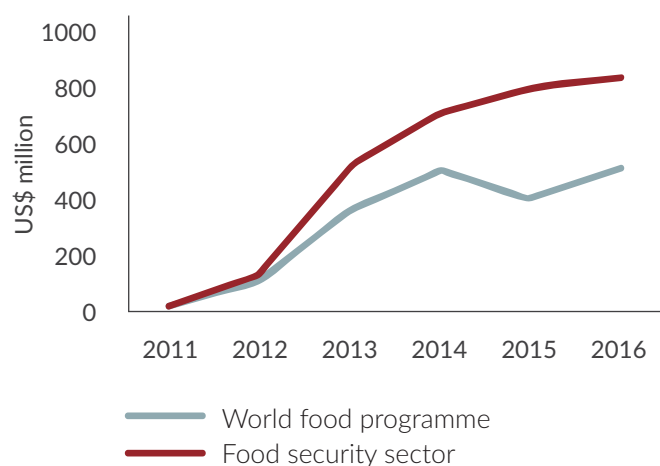
**SECTORAL DISTRIBUTION OF OFFICIAL AID FLOWS, 2011-2016
(SHARE OF EARMARKED OFFICIAL AID FLOWS)**
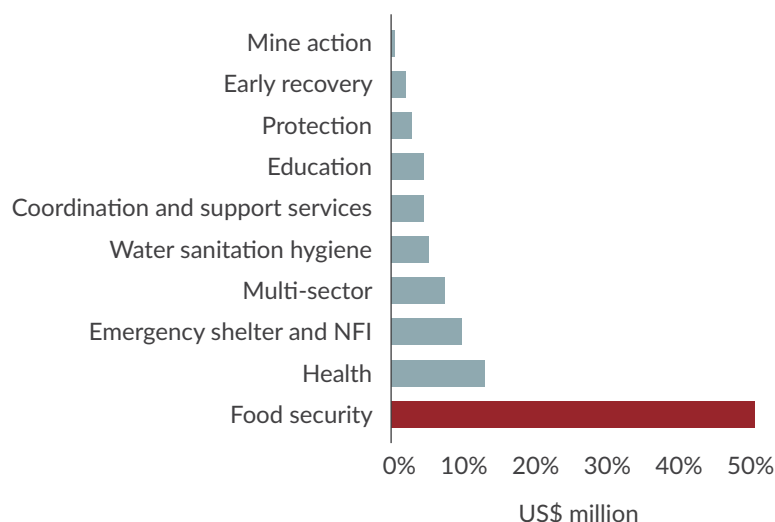
Source: United Nations Office for the Coordination of Humanitarian Affairs, FTS database.

As of December 2016, 5.8 million individuals received in-kind food assistance. Most beneficiaries are in Aleppo, Rural Damascus, and Idlib, while areas such as Der-ez Zor and Ar Raqqa received minor assistance relative to their need (51,000 and 6,000 beneficiaries, respectively). Overall, 1.6 million beneficiaries were in hard-to-reach and besieged areas. The national average cost of a standard food basket is LS 32,332 (US$64) (December 2016), which is 487.5 percent higher compared with 2012. The basket is most expansive in the governorates of Rural Damascus, Homs, and Damascus, and most affordable in As-Sweida, Dar'a, and Quneitra (map 2.11). WFP alone distributes more than four million food baskets per month. The food baskets distributed by WFP provide beneficiaries approximately 1,700 kilocalories per day and consist of the following commodities: wheat flour, bulgur, rice, red split lentils, whole lentils, white beans, oil, salt, and sugar, while their ready-to-eat rations provide beneficiaries approximately 2,100 kilocalories per day and consist of the following commodities: canned fava beans, canned humus, canned vegetables, canned chicken, olive oil, biscuits, halawa, and juice (orange/apple/pineapple or grape, five bottles, 200 milliliters each). The majority of those commodities is imported from Turkey (pulses, wheat flour, bulgur wheat, sugar, and oil); rice is imported from India or Vietnam. The only items bought locally are salt and ready-to-eat rations.

Figure 2.16: Trends in Reported Funding, by Source, 20017−16 (US$, millions)

Legend:
- All other funding
- Government of USA
- European Commission
- Turkey Humaitarian Fund
- Government of UAE
- Government of Sweden
- Government of Germany
- Government of UK
- Government of Kuwait
- Government of Kingdom of Saudi Arabia
- Government of Switzerland
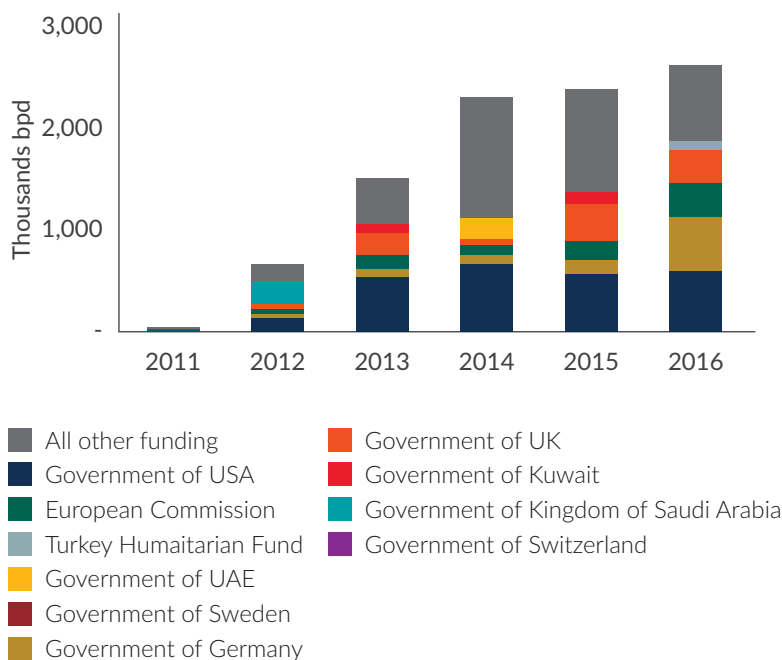
Source: United Nations Office for the Coordination of Humanitarian Affairs, FTS database.

Map 2.11: Number of Beneficiaries, by Sub-District (December 2016)
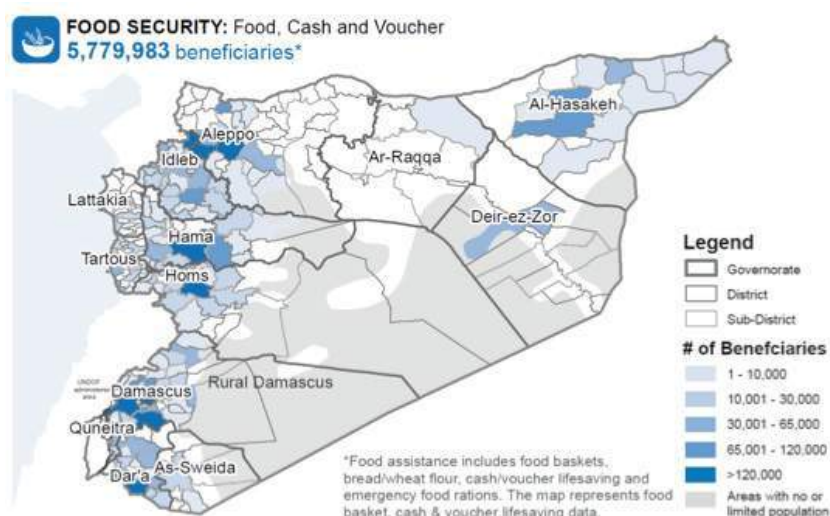
Source: United Nations 2016.

A small cash-based transfer program targets pregnant and lactating women. In 2014, WFP introduced cash-based monthly transfers for pregnant and lactating women. The program now targets 20,000 women in the Homs and Lattakia governorates. The voucher is considered *complementary* to the food basket program, and aims at improving the dietary diversity and micronutrient intake of mothers and mothers-to-be. The vouchers can be used to purchase fresh fruits and vegetables, fresh dairy products, and fresh animal protein (meat, chicken, eggs, and fish) from designated WFP contracted shops. The reference for the value of the voucher is a basic fresh food basket. The prices of these items are monitored monthly and the value of the vouchers is adjusted approximately every three months.

A Syrian man sells fuel in the northern embattled Syrian city of Aleppo on February 9, 2016. Shop shelves are bare and prices have doubled in Syria's Aleppo as the threat of a blockade looms after advancing regime forces cut off the city's second main supply route the previous week. Photo Credit: Karam Al-Masri/AFP/Getty Images.

CHAPTER 3

DISENTANGLING THE ECONOMIC IMPACT OF THE CONFLICT

The economic impact of the conflict is manifested through multiple channels, and each channel has its own bite. The analysis in this chapter shows that physical destruction, by itself, explains only a limited share of the aggregate economic impact. The bulk of conflict-driven economic losses is generated not by destruction of productive factors, but by low utilization of these factors. Disruptions in economic organization are about 20 times costlier than capital destruction alone in the first six years of the Syrian conflict, when measured by the cumulated losses in gross domestic product. Reduced connectivity, higher transportation costs, disruptions in supply chains and networks, increased rent seeking, and erosion of social trust render production daunting in an active conflict environment. In comparison, conflict-related casualties generate the most catastrophic effects for the subjective well-being of Syrians. In addition, they are also the primary drivers of forced displacement, and the economic impacts generated by casualties are much more persistent than other channels. Finally, the analysis shows that the longer the conflict lasts, the slower the post-conflict recovery will be.

CHAPTER 3: DISENTANGLING THE ECONOMIC IMPACT OF THE CONFLICT

What is the economic impact of the conflict on the Syrian economy? Answering this question turns out to be surprisingly difficult. The previous section showed that the conflict has been associated with changes in many areas that can affect the well-being of Syrian citizens. These include casualties, forced displacement, physical destruction, limitations on the mobility of goods and people, and a vast amount of foregone opportunities in the normal course of economic and social life. These multidimensional effects, however, need to be converted into impact assessments before they can fully inform policies like prioritization of mitigating actions and design of reconstruction and reconciliation plans. The conversion to impact assessments entails classifying the individual effects into similar economic categories, comparing them with reliable benchmarks (for example, counterfactuals), and accounting for the overlapping parts to ensure an accurate assessment. However, undertaking such an effort is complicated by several factors:

- *Data are sparse and, when available, vary in quality across different components*. Active conflicts often lead to severe shortages of data. This study did not have the opportunity to collect first-hand data by implementing surveys and interviews in Syria. Thus, only remote-sensing-based assessments and secondary sources of data were used.

- *There is no perfect indicator capturing the full extent of the impact of the conflict*. Aggregating various impacts is desirable to provide the "big picture" and avoid double counting, but requires a conversion of sorts, as different impacts are measured in different units. For example, the destruction of physical assets can be evaluated as rebuilding costs, but not the loss of human lives. The latter entails assigning a monetary value to human lives, which may be controversial, not to mention difficult. Certain aggregate indicators, such as the impact on income (or GDP), could help with some of these issues in the short term; however, they do not reflect the true reality and welfare costs encountered by people in conflict, and may even present an anomalous picture. The U.S. GDP, for example, grew by 11 percent annually during World War II, a record that remains today.

- *The absence of reliable counterfactuals could hamper the assessment of impact*. In any given area of interest, assessing the impact of the conflict entails a good understanding of what would happen had there been no conflict. For "exogenous" events like natural disasters, these are relatively straightforward. The "business as usual" scenario could provide a relatively reliable counterfactual. In the case of a conflict, however, the conflict itself is an outcome of various factors, including income distribution, quality of institutions, and mobilization costs. Thus, it is not always clear what it means to have no conflict when underlying conditions dictate it. The regional

economies that could provide a comparison point are affected by the factors that triggered the conflict and the conflict itself. Therefore, it is difficult to estimate what Syria would look like now in the absence of conflict.

• *The conflict is an active conflict, and its effects will continue to materialize long after it ends.* The effects of casualties, destruction of physical assets, and, perhaps most importantly, degradation of institutions will have long-lasting impacts on the well-being of the surviving Syrians. A large portion of these effects has not yet been captured by current estimates of indexes like the poverty rate or income; thus, a forward-looking analysis is in fact a crucial aspect of impact assessment. In the absence of alternatives, second-best solutions are utilized. As described in the previous chapter, the data problem was tackled by a pragmatic approach that uses verified remote-sensing information and data from secondary sources.

First, without a reliable counterfactual, a statistical method was utilized to generate imperfect counterfactuals for aggregate economic variables like GDP. The GDP series that are calculated by statistical methods based on pre-conflict data series are compared with the national accounts–based GDP estimates, to produce an assessment of GDP impact since the beginning of the conflict.

Second, an integrative framework that is based on a dynamic general equilibrium model was introduced to deliver different indicators of impact in a consistent manner. This framework is used to run several inquiries that are not directly observable from data. These include assessing the relative importance of difference channels (physical destruction, casualties, and economic disorganization) in the manifestation of the conflict's impact. In addition, the role played by demographic mobility is also discussed, by using quantitative implications. Finally, the propagation of the conflict's post-conflict impact is analyzed, by using various conflict end-time scenarios.

Aggregate Impact

A first step in assessing the impact of the conflict on Syrians' well-being is to generate an estimate for the aggregate impact. The effects of the conflict in different fields may have overlapping components that have to be counted only once, and not twice. For instance, the delivery of water often uses electricity as an intermediate input; the impact assessments should add up the changes in value added in these sectors, not total nominal values of outputs. GDP calculations help to do this. But, like all indicators, GDP-based calculations fail to capture some other dimensions, which will be discussed.

Impact on GDP

Overall, economic outcomes deteriorated significantly during the conflict; but that is not the whole story. The previous chapter summarized the

estimates of economic performance in Syria since the beginning of the conflict. Simply comparing these estimates with those prior to the conflict, however, does not provide the "impact." To estimate such impact, the actual economic outcomes need to be compared with where Syria would have been today had there been no conflict (figure 3.1). Unfortunately, it is impossible to know that with precision. With significant changes in external conditions, including the drastic change in oil prices over the past few years and the outbreak of the Arab Spring, it is difficult to accurately estimate how the Syrian economy would have evolved.

This study employs various statistical approaches to estimate a counterfactual path for the Syrian GDP. In the absence of a reliable counterfactual, the options are limited. Simple benchmarking is not possible, because the set of comparable countries are influenced by the conflict itself, or they have not been fully exposed to the changes Syria would have experienced even in the absence of the conflict. This study employs synthetic control methods (SCM), which control for several factors (institutions, human capital, physical capital stock, population, and so forth) that cannot be controlled by simple benchmarking to produce counterfactual estimates for Syrian GDP (box 3.1). In addition, simple benchmarking and vector autoregression–based estimates are also computed for further checks.

Figure 3.1: Conceptualization of Pre-Shock, Post-Shock, and Counterfactual Relationship
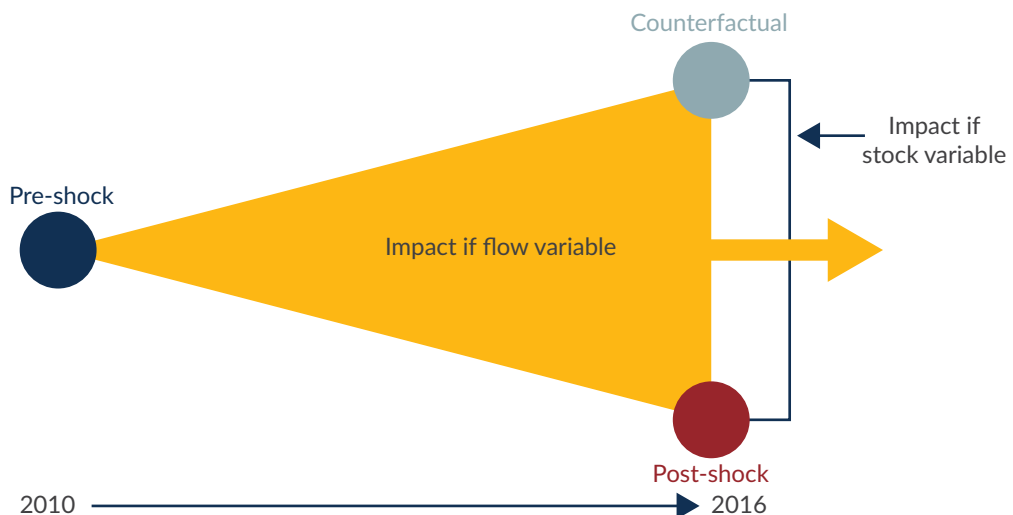
The estimates under various techniques show similar outcomes: Syrian GDP was forecast to continue growing without the conflict, albeit at a slower rate than during the pre-conflict era. Figure 3.2 depicts two synthetically constructed Syrian real GDP per capita estimates, which use different weights obtained from the two different donor pools using SCM. First, it is important to note that the in-sample estimates provided a good match with the actual series before the conflict. SCM1 is preferred to SCM2, as the former better reflects the impact of declining oil prices in growth in 2015 and 2016, as the donor pool is restricted to countries with known similar structural features (including oil exporters). Overall, however, both techniques estimate a GDP per capita of around about $6,000 (in 2010 dollars) in 2016, compared with about $5,700 in 2010.

Figure 3.2: Comparing the Counterfactual Real GDP per Capita by Different Methodologies with Actual Estimates
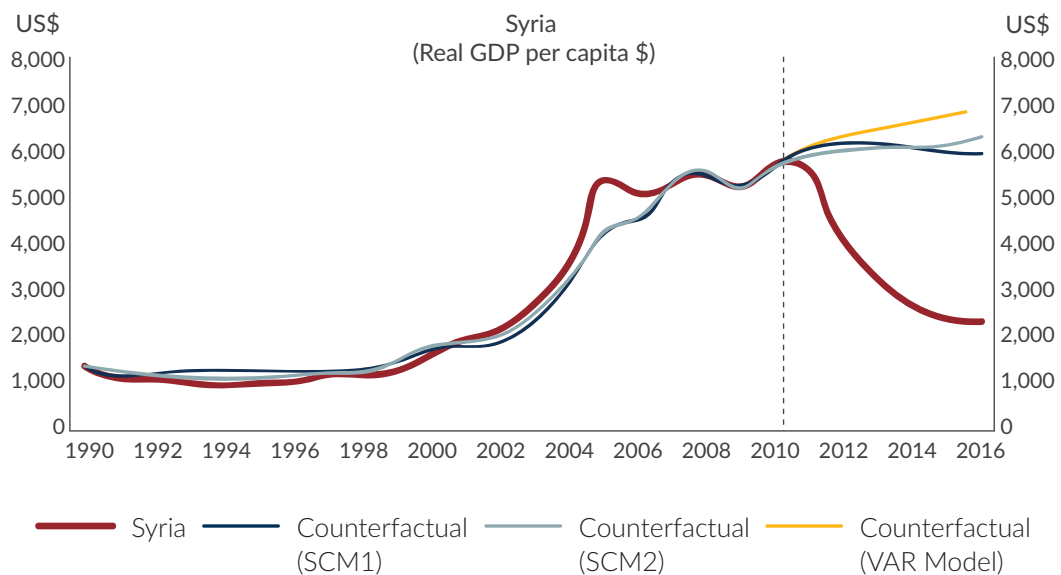
Box 3.1: Counterfactual GDP Calculations

The Synthetic Control Methods (SCM) was developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010). SCM allows the creation of a control group without needing to find one country or case study. The approach also avoids the arbitrariness of the selection of the control group, by relying on a combination of comparator countries that best approximate the characteristics of the country that is exposed to the shock. A combination of comparator countries is likely to produce a better control/comparison group for the country exposed to the shock than any one comparison unit alone.

Box 3.1 (cont.): Counterfactual GDP Calculations

By checking the pre-shock differences between the outcome variable for Syria and the synthetic Syria, we are able to judge the quality of the control group. We can then create the counterfactual outcomes for Syria, by controlling for the effect of the conflict through identification of the comparator countries that best predict the historical development of Syria prior to the conflict, by using a set of predictors. This produces a set of weights for each country (most end up being 0, as they are not relevant) and these weights are used to construct a synthetic Syria series based on the actual outcomes for the comparator countries during the period of the conflict, to produce a counterfactual Syria.

Finally, this approach allows us to conduct robustness checks by way of p-values, by conducting the same approach on every other country in the donor pool to produce a distribution of effects, and seeing the significance of Syria's post-treatment difference compared with all other countries. This allows us to build a confidence level for our inference that confirms that the variation in the data is due to the impact of the treatment (conflict). In this exercise, this will be frivolous, as the impact of the conflict is so severe and pervasive that there will necessarily be a very large variation between the counterfactual outcomes and the actual outcomes.

Specification and Data

Following the endogenous growth theory literature, the vector of predictors that was selected to explain economic growth included the stock of physical capital, stock of human capital, democracy proxy, trade openness, and population growth. This is a common specification for cross-country growth simulations and was most recently utilized by the International Monetary Fund (IMF) in its SCM estimation of reform effects (Adhikari et al. 2016).

The data rely on a cross-country panel data set for the period between 1990 and 2011. The outcome of interest is real gross domestic product per capita, but we also employ the technique for population growth. The majority of the data was sourced from the Penn World Tables until 2014, then data from the IMF World Economic Outlook data were used to extend the data until 2016. These variables capture, in a broad sense, the impact of institutions, demography, and macroeconomic conditions in addition to traditional growth accounting variables, such as the stock of physical and human capital.

Before conducting the SCM to construct Syria's macroeconomic counterfactual scenario, we had to ensure that none of the comparators that were selected violated the exogeneity criterion. Explicitly, we needed to avoid countries that were involved or significantly affected by the conflict. To take this a step further, there is also an argument to restrict the donor pool to countries that have structural similarities to Syria. For example, if the SCM is conducted and finds that Tuvalu, a small island country in the Pacific Ocean with 10,000 people, shared a similar growth path to Syria historically, there may be sufficient grounds to imagine this was a spurious correlation. Accordingly, we conduct the SCM using two donor pools of countries. The first donor pool is a restricted group based on the countries identified as comparator countries. The second donor pool is all countries in the world excluding those that were involved in or significantly affected by the conflict.

Figure 3.3: Actual and Counterfactual GDPs and Cumulative GDP Losses
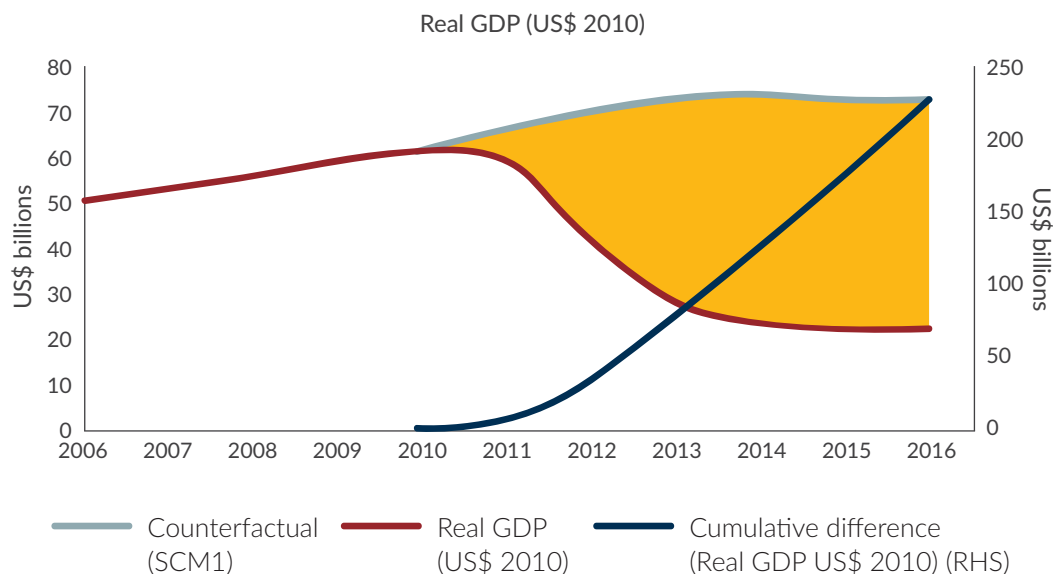
Source: World Bank staff estimates.

What is the impact of the conflict on Syrian GDP? The impact is calculated by using the SCM1 counterfactual (which is broadly similar to that of SCM2) and the estimates for the actual GDP per capita of Syria presented in the previous chapter. Actual GDP fell US$51 billion (in 2010 prices) short of the counterfactual GDP in 2016. From 2011 to 2016, the accumulated impact on real GDP is estimated to be US$226 billion (in 2010 prices, Figure 3.3), nearly two times the GDP in 2010. This is mostly driven by the steep drop-off in actual GDP estimates, leading to a 63 percent reduction in the size of the GDP compared with 2010. Once the conflict ends and Syria begins reconstruction, based on previous experiences in post-conflict economies, actual GDP will quickly rebound and start closing the gap with the counterfactual. Nevertheless, given the intensity and protracted nature of the conflict, the losses will have permanent effects on the well-being of many generations.

Beyond GDP

GDP is an imperfect measure of well-being even in peaceful times, and more so during conflict. By denoting the value of aggregate final goods and services produced in a year, including the production of military assets that are "consumed" by the public, GDP, by itself, does not fully capture the complex effects of the conflict on Syrians' well-being. For instance, an important aspect of the conflict's impact is on the life expectancy of Syrians, which is estimated to have fallen from 74.4 years in 2010 to 69.5 years in 2016 (World Health Organization), both measured at birth. This five-year drop in life expectancy

has set Syria back about three decades (the last time the Syrian life expectancy at birth was recorded at 69.5 years was in 1988). Even when the welfare of an average Syrian citizen is simply measured by her income and longevity only, it is obvious that focusing only on income changes over several years is insufficient (figure 3.4). Yet, because income and life expectancy are measured in different units (dollars and life-years, respectively), measuring the deterioration in welfare requires some sort of a conversion between the two.

Figure 3.4: Indifference Map for Income and Life Expectancy in Syria
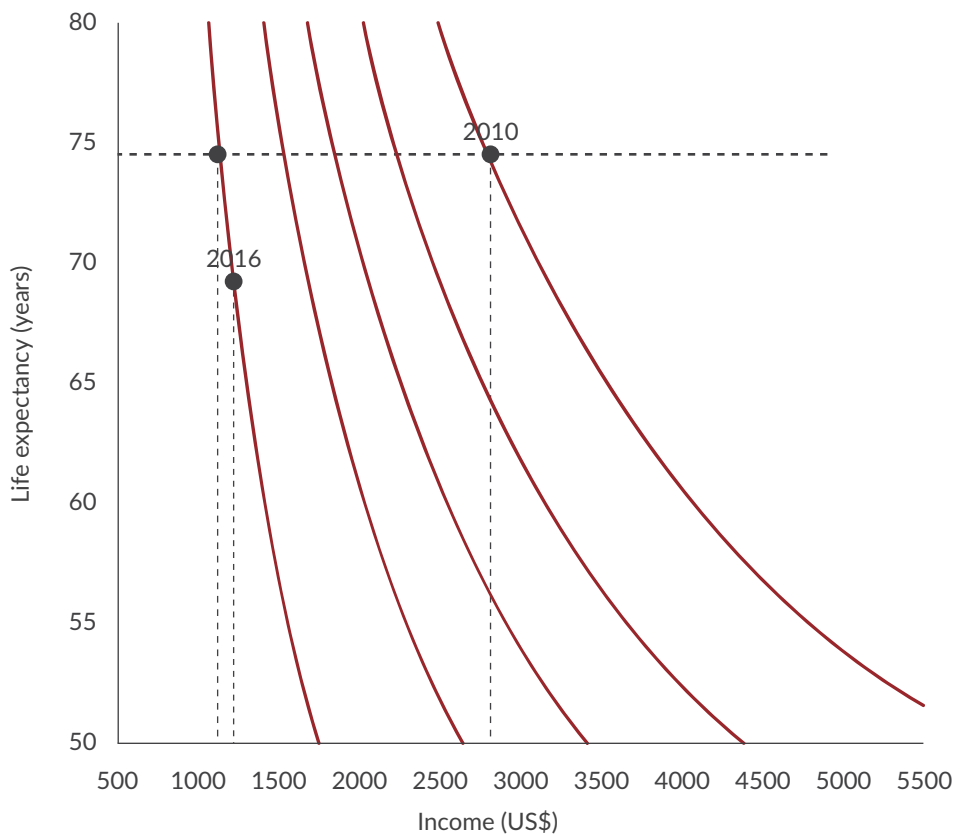
Source: Onder, Ponthiere, and Pestieau (2017).

A simple calculation shows that the loss due to reduced life expectancy could be as high as 45 percent of pre-conflict income. Onder, Ponthiere, and Pestieau (2017) use an "equivalent income approach" to quantify the domestic welfare loss associated with decreasing life expectancy in a simple way. This involves comparing the lifetime welfares of an average Syrian citizen (welfare is defined as based on income and longevity) before the conflict and at the sixth year of the conflict. Since longevity and income are lower in the sixth year of the conflict than before it, welfare is also lower, unambiguously

(figure 3.4). The next step is to decompose the welfare effects determined by income loss and longevity loss. To do this, the income in the sixth year of the conflict is increased hypothetically until it reaches a level (equivalent income) where the person reaches her pre-conflict welfare, while holding the short longevity fixed. The results show that this hypothetical income level could exceed the actual pre-conflict income by 45 percent. With actual income decreasing by about half because of the conflict in this simple exercise, the welfare loss because of decreasing longevity is significant.[27]

The next section extends this analysis by introducing an extended set of impact indicators. To provide a more comprehensive assessment of impact, which takes into consideration the medium and long-term effects of the conflict, the analysis next turns to combining the damage and loss assessments developed so far and producing indicators of impact that capture different dimensions in a consistent manner.

Integrative Framework

This section of the report focuses on the prominent underlying factors that shaped the impact of the conflict on Syrians. To assess the unmeasured dimensions of the impact of the conflict, this section will employ a simulation model (Artuc and Onder 2017). Figure 3.5 illustrates the main operating principles of the simulation model; box 3.2 provides a summary of the model's characteristics, and the appendix to this report contains the formal definitions.

The first objective is to assess the relative importance of each channel through which the conflict might have manifested its impact. The analysis focuses on the following three major conflict-related mechanisms to explain the overall economic impact. Table 3.1 shows the baseline and alternative specifications of shocks and other factors, followed by the analytical approach.

- *Capital destruction*. This encompasses the damage to all economically relevant physical capital, including infrastructure, machinery, and buildings. The extent of destruction is determined by using the physical damage assessments in the housing sector across governorates.

- *Casualties*. This focuses on directly conflict-related casualties, which rely on the midpoint of the casualty estimates provided in the previous chapter. Aside from the obvious distress and welfare impacts on families, the economic impact of casualties includes reduction in productive labor and forcible displacement of Syrians.

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[27] The roles played by income and longevity are relatively robust to alternative parametrizations of the Constant Relative Risk Aversion period utility function used in this exercise. However, the role of longevity varies between alternative measurement methods when losses in social welfare are calculated. An ex ante approach measures social welfare by taking a uniform life expectancy at birth for all Syrians; thus, reduction in life expectancy affects the lifetime welfare of all individuals in the same manner. An ex post approach, however, takes into account the variation in actual life spans among individuals. The ex post approach penalizes early mortalities, especially when the social welfare function reflects aversion to inequality, and thus, the estimated welfare impact of the conflict is higher in this case.

- *Economic disorganization.* This comprises all factors that lead to reduced productivity or idleness in factors of production, including, but not limited to, losses in network access and connectivity (which may reduce access to input and marketing opportunities), reduced participation in economic activity arising from security concerns, and any other intangible capital that may have been destroyed. Methodologically, this component provides a residual category in calibrations: given capital destruction and casualties, the level of economic disorganization was chosen to target observable outcomes (changes in GDP and interregional mobility).

Next, the analysis focuses on the role of mobility in shaping the impact of the conflict on Syrians' well-being. The demographic analysis in the previous section showed that one of the most striking consequences of the conflict has been the large-scale demographic displacement of Syrians. On the one hand, the exodus of people from conflict-prone regions may improve welfare by reducing casualties. On the other hand, demographic mobility could further reduce economic activity, as displaced people do not immediately integrate into the labor markets at destination. To assess the relative importance of these effects, the analysis will compare the baseline results with alternative scenarios where moving out of the country or all mobility (internal and external) is restricted.

The impact of the conflict will propagate past the immediate end of the conflict, whenever it happens, as shown by the use of different conflict end-date scenarios. The recovery in investment and capital stock may take place relatively rapidly, but the recovery of human capital and economic organization will take years, if not decades. The persistence of these effects is particularly significant when conflict is protracted. The longer is the conflict, the deeper are the effects. Thus, to put the baseline impact estimates into perspective, the analysis will consider alternative end-dates to the conflict. The baseline scenario assumed that the conflict ends within the current year (2017). The next scenario will extend this date to 2020. The final scenario will assume that the conflict does not end in the near future, and this will provide a worst-case benchmark. The analysis assumes that, when the conflict continues, the additional years of conflict have the same damage ratio and geographical composition as previous years. Although this assumption is not perfect, it is less arbitrary than other potential assumptions for the future path the conflict may take.

In all cases, various indicators are used to compare the effects of the underlying factors. The analysis compares different scenarios on the basis of their outcomes in various indicators, including flow variables in annual terms like GDP and wages. In addition, these effects are accumulated over various periods (for example, from the beginning to the end of the conflict as well as benchmark years after the end of the conflict). To put these numbers in perspective, we compare them with the corresponding annual pre-conflict values. Finally, the present values of future wages are also reported to provide a more continuous observation of the effects on material well-being.

Figure 3.5: Simulation Diagram

BEFORE CONFLICT

OTHER REGIONS

CAPITAL
Depreciates at a normal rate, replenished by investment

NETWORKS
Link active capital and active workers at a normal rate (allows equilibrium unemployment)

LABOR
In each period, decides to move to another region/sector or not in a "smart" way (by taking all future outcomes into consideration)

AFTER CONFLICT

OTHER REGIONS

CAPITAL
Depreciates at a high rate (calibrated by using remote-sensing damage assessments), replenishment by investment slows down

NETWORKS
Link active capital and active workers at a lower rate (calibrated by targeting actual GDP and migration patterns)

LABOR
Given higher probability of death and low livelihood opportunities, emigrates at a faster rate

Box 3.2: Simulation Model

The simulation model builds on the model in Alix-Garcia, Artuc, and Onder (2017) and extends it in various aspects, including the characterization of a conflict environment and a built-in matching mechanism. The model comprises 14 regions (governorates) in Syria and a stylized outside region to account for outmigration. Agents, who are identical otherwise, choose a region in which to live and work every period. Moving to a different region entails a one-time cost, which has a fixed and a random component.

Agents

An agent can be employed (active) or unemployed (inactive). Active agents are paid wages that are determined by market conditions, while inactive workers get a (small) fixed income, for example, a transfer. When a worker moves to a new region, she is initially inactive. She searches for a job and is matched to a vacancy in the region with some probability, which increases when the size of the pool of searchers (new arrivals, new separations, and unmatched workers from previous periods) is small. The number of matches is determined by a Cobb-Douglas matching technology. For simplicity, the separation probability is assumed to be equal to the capital depreciation rate. The matched worker-employer pair constitutes a factor of production, that is, a job. This factor produces an output together with the capital factor via a Cobb-Douglas production function, and it receives its marginal product. The employer and employees share this marginal product equally.

The welfare of agents is characterized by a Constant Relative Risk Aversion (CRRA) utility function with various degrees of risk aversion. An important implication of this is that utility is assumed to be zero in the case of a death, which in principle may be disputed. A different assumption, for example, a negative utility in the case of death, would have quantitative effects on the computations of welfare (Onder, Ponthiere, and Pestieau (2017) employs a range of negative utilities from death in calculating equivalent incomes). The probability of death is specific to regions, and determined by the intensity of the conflict. For simplicity, we assume that the agents who migrate outside Syria (refugees) receive a fixed, exogenously determined utility in every period with certainty.

Capital

The potential supply of capital is defined over a fixed continuum in each region, for example, land. Similar to workers, there are two types of capital: active and inactive. In each period, some of the active capital depreciates and becomes inactive. With the conflict, this depreciation rate increases and varies across different regions. After becoming inactive, capital can be activated by investment, which requires an investment cost with fixed and random components. If the investment cost is larger than the value difference of active and inactive capital, the capital stays inactive. If not, the capital becomes active after paying the cost. This decision is repeated for every unit of inactive capital every period.

Capital receives a rent equal to the marginal product. The value of capital is calculated using the expected rents, probability of depreciation, and distribution of investment shocks. (It is similar to the case of the problem for workers, but simpler.)

> **Box 3.2 (cont.):** Simulation Model
>
> **Shocks**
> Shocks are stochastic, for example, they are unpredicted by agents. With economic disorganization shock, productivity decreases and the separation probability increases. Capital shock increases the capital depreciation rate significantly, which is also reflected in investment decisions, as the depreciation rate changes the net returns to investment as well. A casualty shock not only leads to deaths in the current period, but also increases the probability of death in future periods; thus, when there is a casualty shock at some location, people perceive this as a security threat in the coming periods.
>
> **Calibration**
> The model's parameters are calibrated with widely used standard approaches from the economics literature (risk aversion parameter in CRRA utility 0.9, annual capital depreciation in non-conflict years of 2.5 percent, and so forth). The shocks are calibrated to match the physical damages, cross-governorate and cross-border migration, and gross domestic product outcomes by the end of the six-year conflict, as summarized in the previous section. We did not aim to match the year-by-year changes within that six-year period.

This framework does not capture many other effects. The simulations that are presented here do not capture several important outcomes, including environmental, cultural, political, and security-related effects that are posed by the conflict. These left-out effects are nevertheless crucial determinants of Syrians' well-being. In addition, the results are presented in comparison with pre-conflict levels, leaving aside the discussion on counterfactuals.

Table 3.1: Structure of the Simulation-Based Analysis

	Baseline	Channels of impact			Mobility scenarios			End scenarios	
SHOCKS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital destruction	✓	✓			✓	✓	✓	✓	✓
Casualty	✓		✓		✓	✓	✓	✓	✓
Economic disorganization	✓			✓	✓	✓	✓	✓	✓
MOBILITY									
Income-based mobility							YES		
Welfare-based mobility	YES	YES	YES	YES	YES	YES		YES	YES
Internal mobility allowed	YES	YES	YES	YES	NO	YES	YES	YES	YES
External mobility allowed	YES	YES	YES	YES	NO	NO	YES	YES	YES
END OF CONFLICT									
Conflict end year	2017	2017	2017	2017	2017	2017	2017	2021	n/a

Channels of Impact

The economic impact of the conflict is manifested through multiple channels.
The simulation results show that the negative effects of the conflict are not
only generated by destruction of capital and human lives, but also by
behavioral responses, like reduction in investment in the baseline scenario.
With a combined shock, investments drop to about 80 percent lower than
their pre-conflict levels and remain there throughout the duration of the
conflict (table 3.1). This reduction is primarily driven by low expected returns
to investment: a decrease in overall productivity, a high destruction rate of
physical capital, and a decrease in available labor (as more than 3.5 million
Syrians leave the country in gross terms over the course of the conflict) bring
down the payoff to investing. As a result, by the end of the conflict (which is
the end of the sixth year in the baseline), GDP remains at 65 percent lower
than its pre-conflict level. To put this in perspective, this reduction means a full
erosion of the economic achievements of the decade preceding the conflict.

Capital destruction, by itself, would have a relatively subdued effect. To
assess the implications of physical capital destruction only, the simulations
turn to scenario 2 (capital destruction only), as specified in Table 3.1. This
includes using the rate of destruction observed in physical damage
assessments as of February 2017 to calibrate the capital destruction shock.
The results show that if the conflict only destroyed capital (at the same rate it
has done so far), without other effects, its impacts on income and welfare
would be relatively limited. To see why, note that when only capital is
destroyed, investments decrease by about 22 percent from the initial level
relatively quickly and remain there throughout the years of the conflict. In
comparison, they decrease by 80 percent when all shocks (capital destruction,
casualties, and economic disorganization) are introduced in the baseline
scenario.[28] In the absence of other effects on labor and productivity, an
increase in capital depreciation/destruction does not reduce profitability as
much. This mechanism highlights a remarkable difference between natural
disasters and conflicts. When a natural disaster destroys built capital in a
well-functioning market economy with strong institutions, the recovery of
capital stock is rapid, and impacts are not persistent. Conflicts are different:
casualties, demographic movements, and lower returns to investment
compound the damage to physical capital. As a result, the effective losses due
to physical capital damages are more pronounced, and they can linger into the
future at a much higher rate than in natural disasters.

---

[28] To see why investments can decrease in the case of the capital-destruction-only scenario, there are two distinct
mechanisms that affect the incentives to invest in our model. First, given a fixed continuum of capital in different
cities (for example, land), which prevents an excessive agglomeration after a shock, there is an upper bound to
investment, which becomes more binding as demographic mobility concentrates population in conflict-free
areas. Second, in a given location, the investment decision is affected by two factors: the return to capital in a
given period and the probability of further physical damages in future periods. Thus, even when capital
destruction increases the marginal productivity of capital, and thus return to investment in a given period, a
sustained attrition in physical capital may still deter investments.

Stability and a conducive business environment are crucial for investments to play a major role during recovery. The result above shows that destruction of capital hurts most when it is combined with factors restricting the expected returns to investment. These include human capital loss, demographic dispersion, institutional degradation, and escalation in rent-seeking behavior. All these are prominent in the current conflict. In the absence of such complications, investment could jump back to pre-conflict levels quickly, and help the economy recover rapidly along with recovery and reconstruction efforts. Simulations show that investments would be back to their pre-conflict level four years after the end of the conflict in a capital-destruction-only scenario. Historical experience in countries like post-war Germany and Japan, where conflict did not recur, also support this view. For instance, Davis and Weinstein (2002) show that the Japanese cities that were bombed during World War II reached their pre-conflict relative sizes vis-à-vis other cities in about 20 years after the end of the war. In comparison, post-conflict recovery is much slower in countries with a high risk of resurgence in violence. Mueller, Piomentese, and Tapsoba (2017) show that this is because, in peaceful years, post-conflict countries with a high likelihood of conflict recurrence grow no faster than countries with no conflict history and substantially slower during the resurgence of violence.

Casualties are the primary drivers of outmigration. When the conflict brings about casualties only (scenario 3 in table 3.1), the impact on GDP is found to be comparable to that of capital destruction. In both cases, the current GDP effects remain less than 5 percent, compared with the pre-conflict levels during the years of conflict. Behind this similarity, however, lies a major difference between the two. Conflict-related casualties lead to a massive exodus of Syrians, whereas capital destruction does not. Simulations show that about 2.5 million out-migrants of 3.5 million in the baseline can be attributed to casualty-related factors alone. This reduces GDP, but not at a drastic level, because the decrease in investment remains relatively modest in this case. Investment decreases by about 22 percent in the capital-destruction-only scenario and only about 14 percent in the casualty-only scenario.

The impact of casualties is much more persistent than that of the other shocks. The accumulated losses in GDP reach 93 percent of the annual pre-conflict GDP by the 20th year after the beginning of the conflict (table 3.2 and figure 3.6). Only a sixth of this effect takes place during the years of the conflict. In comparison, the accumulated loss is 26 percent of GDP in the capital destruction scenario. About two-thirds of this effect is manifested during the conflict.
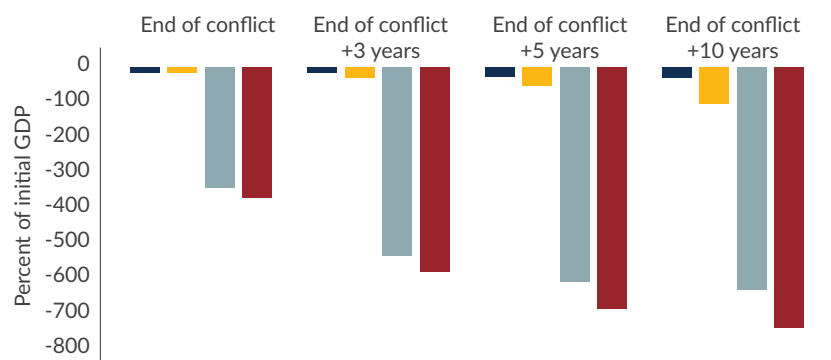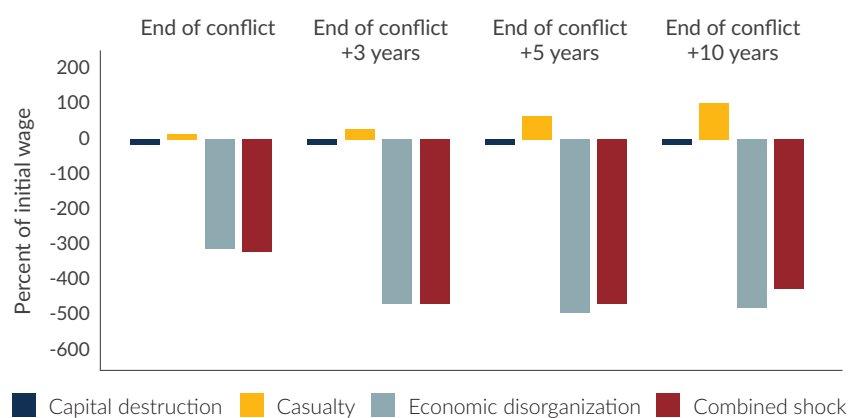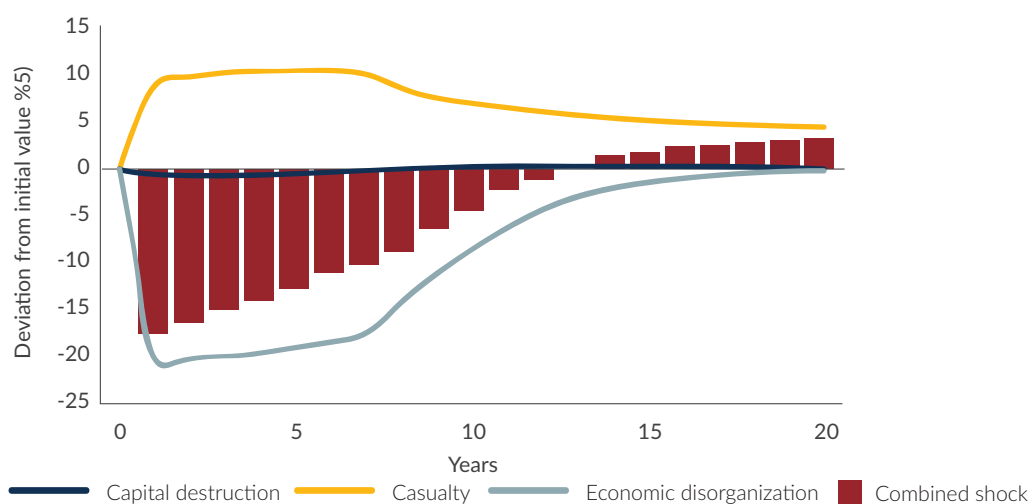
Table 3.2: Combined and Isolated Impacts of Shocks
(Outmigration in millions; other variables in comparison to their pre-conflict
values in percentage terms)

	Conflict						Post-conflict		
	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	10th Year	15th Year	20th Year
BASELINE (COMBINED SHOCKS)									
Investment	-83.18	-81.77	-80.61	-79.58	-78.66	-77.80	-13.77	-7.31	-6.50
Outmigration	0.81	0.70	0.63	0.58	0.53	0.49	0.00	0.00	0.00
Wages	-54.99	-54.81	-54.70	-54.64	-54.60	-54.57	-23.53	10.31	8.55
GDP	-58.34	-60.60	-62.20	-63.42	-64.38	-65.15	-42.38	-13.16	-11.12
CAPITAL DESTRUCTION ONLY									
Investment	-23.07	-22.85	-22.73	-22.65	-22.60	-22.57	0.01	-0.03	-0.04
Outmigration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wages	-1.54	-2.31	-2.70	-2.92	-3.04	-3.10	-0.13	0.02	0.04
GDP	-1.62	-2.44	-2.89	-3.16	-3.34	-3.46	-0.59	-0.31	-0.23
CASUALTY ONLY									
Investment	-13.25	-13.41	-13.71	-14.04	-14.38	-14.71	-5.76	-5.57	-5.18
Outmigration	0.71	0.51	0.40	0.34	0.29	0.26	0.00	0.00	0.00
Wages	0.84	1.66	2.41	3.08	3.69	4.26	6.55	6.57	6.11
GDP	-1.88	-2.33	-2.64	-3.00	-3.42	-3.89	-5.13	-5.82	-5.87
DISORGANIZATION ONLY									
Investment	-75.46	-75.04	-74.70	-74.41	-74.15	-73.91	-9.09	-2.62	-2.21
Outmigration	0.13	0.14	0.15	0.15	0.16	0.16	0.00	0.00	0.00
Wages	-54.52	-53.89	-53.34	-52.86	-52.42	-52.02	-27.22	4.09	2.97
GDP	-55.97	-57.08	-57.95	-58.66	-59.26	-59.76	-37.05	-6.63	-4.98

Note: Outmigration is reported in millions and in gross terms.

wages increase. Focusing exclusively on a single indicator, for example, current wages, could imply that conflict is good for Syrians. However, this is obviously misleading, because it does not take into consideration the well-being of the deceased. Although the survivors may experience an increase in GDP, the Syrian population incurs significant welfare losses in aggregate. As the effects of the conflict extend well beyond casualties, the casualty-only scenario is purely illustrative of the impact that the casualty channel has on key economic variables.

The bulk of the impact of the conflict is associated with disruptions in economic organization. Using capital damage and the casualty number estimates from the damage assessments, our simulations show that the bulk of the conflict's economic impact must be associated not with the net decrease in productive factors of production, but with how the remaining productive factors are put to use. The conflict not only destroys productive

Figure 3.6: Dynamics of Impact under Various Shock Scenarios

CUMULATIVE CHANGE IN GDP

CUMULATIVE CHANGE IN WAGES

Capital destruction   Casualty   Economic disorganization   Combined shock

PRESENT VALUE OF FUTURE WAGES

Capital destruction   Casualty   Economic disorganization   Combined shock

factors, it also increases rent seeking and cronyism, prevents the connectivity of people, reduces their incentive to pursue productive activities, and breaks economic networks and supply chains. Simulations show that these factors, which are captured by changes in total productivity and matching mechanisms built into the model, by themselves would lead to reduction of GDP by more than half over the course of the conflict. In cumulative terms, losses in GDP are equivalent to six times the annual pre-conflict GDP after 20 years.

In practice, there are many mechanisms that drive the disruptions in economic organization. The simulation model in this report captures the effect on economic organization under two aggregate categories: a diminished propensity of matching between active capital and labor and a lower total factor productivity. In practice, there are many factors that feed into these categories, including, but not limited to, higher trade costs, disruptions in supply chains and other economic networks, and intensified rent seeking. Unfortunately, many of these are not quantifiable with the current level of access to information in Syria. The previous chapter showed estimates for increased distance of travel among major cities, which can proxy for higher trade costs; but that is only a small component of the problem. Recently, the Syria Center for Policy Research, documented a significant decrease in Syrian social capital, defined over three broad categories: social networks and community participation, trust, and shared values and attitudes (SCPR 2017). The study's social capital index, which relies on a community-based survey encompassing all governorates, registered a 30 percent decrease from the beginning of the conflict until mid-2014 when the survey was conducted.[29] This decline is largely explained by a sharp fall in the community confidence and networks components. Geographically speaking, the composite index registered the highest decreases in Raqqa (80 percent), Hasake (52 percent), and Idleb (47 percent). Such institutional degradation must have had significant effects on the economy's capability of putting productive factors into use; however, characterizing the exact channels of transmission and identifying the optimal offsetting mechanisms are beyond the scope of this report and will require more targeted studies.

Post-conflict planning should extend attention beyond physical destruction. What would it take to ensure a rapid and sustainable economic recovery in the post-conflict Syria? Our simulations and anecdotal evidence suggest that even reinstating the lost capital, by itself, would not be sufficient to bring the economy back to its pre-conflict level if institutional and organizational challenges are not tackled simultaneously. Regardless of the source of financing, boosting public investments without a comprehensive approach

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[29] The "Population Status Survey" was conducted with key informants in 698 residential areas across Syria. The social capital index is a simple average of three normalized components: social relations and networks (measured by participation in decision making, volunteering, problem solving cooperation, and women's participation); community trust (measured by trust between individuals and the sense of security); and common values, attitudes, or understandings (measured by the degree of consensus among the members of the community on a shared vision of the region, and the status of women in society).

would trigger further rent seeking and cronyism, which were important enabling factors in the conflict's onset, as described in chapter 1. Thus, recovery and reconstruction are by no means an engineering issue; our results show that the issue is primarily an economic and social one, where the incentives of Syrian citizens are at the core.

Role of Mobility

Mobility has important consequences for economic outcomes. But is it good or bad for Syria? In a textbook economic framework with no externalities, the flexibility to move across regions or jobs always improves the efficiency of the economy. However, does this conclusion hold in the case of a catastrophic event like the conflict where about half of the country's population is forced to move? In this section, we will try to shed light on the role played by displacement in shaping the impact of the conflict on the Syrian economy.

Why have Syrians migrated?

The exodus of millions of Syrians triggered a debate about the motivation behind this movement. The conflict has led to a massive outflow of Syrians from their homeland. In December 2016, the total number of registered Syrian refugees was nearing five million (UNHCR). It is important to identify the push and pull factors behind such movement in a careful and detailed manner. Nevertheless, the analysis developed for this study can shed some light on the relative importance of security and economic factors in explaining the mobility of Syrians.

Security considerations dominate economic concerns in explaining demographic mobility. Our simulations do not support the view that refugees are mostly economic migrants. To shed light on the motivations to move, the analysis considers a case where individuals are risk-neutral as opposed to being risk-averse, which was assumed in the baseline (a widely accepted moderate degree of risk aversion, $\sigma=0.9$, was chosen from the economics literature). Overall, risk-neutral and risk-averse agents migrate by comparing expected wages in different locations; however, risk-averse agents "overreact" and move away disproportionately when the probability of conflict-related deaths increases. The results are shown in table 3.3. Holding everything else constant (including the shocks), when agents are risk-neutral, gross outflows are significantly smaller than that in the baseline (about 10,000 refugees a year during the conflict as opposed to more than half a million under the baseline), and this happens although GDP and wages fall in a comparable manner in these scenarios. This finding shows that a high emphasis on the escalated probability of death that comes with the conflict is the primary driver of mobility.

Table 3.3: Economic Outcomes under Risk Neutrality
(Migration in millions; other variables in comparison to their pre-conflict values in percentage terms)

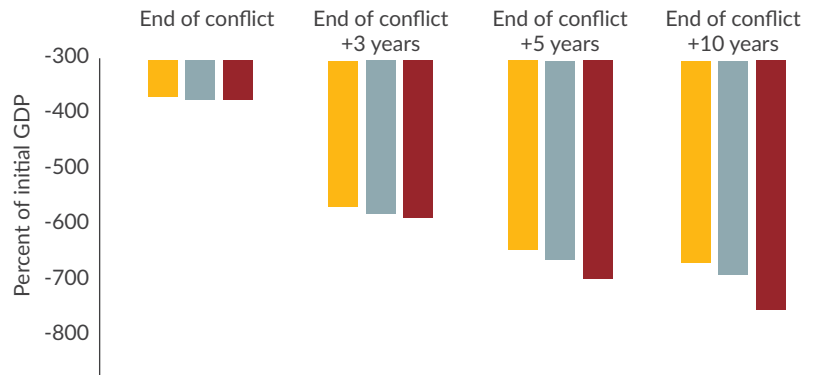|	Conflict						Post-conflict		
	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	10th Year	15th Year	20th Year
Investment	-84.72	-83.99	-83.30	-82.65	-82.02	-81.44	-8.47	-1.64	-0.91
Outmigration	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Wages	-55.01	-54.62	-54.33	-54.11	-53.94	-53.82	-25.89	4.49	2.25
GDP	-59.37	-62.77	-65.38	-67.42	-69.04	-70.32	-47.11	-13.09	-7.79
PV of Wages	-23.77	-25.40	-26.53	-27.24	-27.60	-27.66	-16.99	-7.21	-3.84

What would happen without mobility?

The most direct implication of mobility restrictions would be a greater casualty rate. The cumulative conflict-related casualty in Syria was estimated at about 1.5 to 2 percent of the 2010 population as of December 2016. This ratio could easily climb rapidly if Syrians could not migrate. Migration restrictions involve accessibility barriers (like the difficulties of crossing the Mediterranean Sea) and policy barriers (like a destination country sealing off its borders against refugee arrivals). To account for the consequences of these, this analysis considers two additional scenarios. First, we assume that only outmigration is restricted; thus, no Syrians can leave the country, but they can become IDPs. Second, we restrict all mobility across the country; thus, nobody can become an IDP or a refugee.
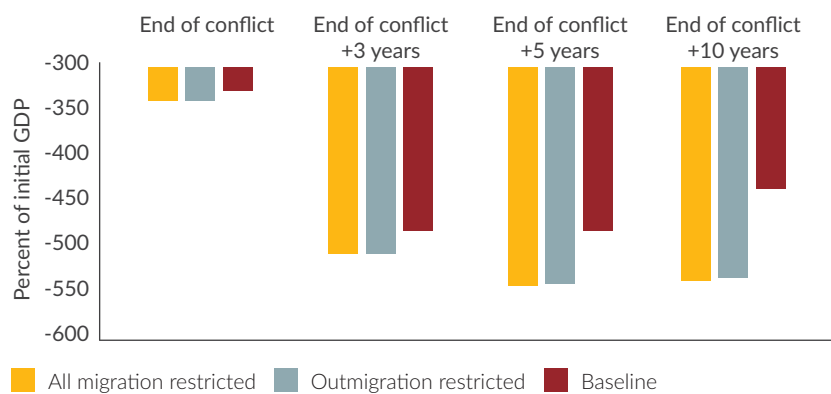
From an economic point of view, a restricted migration regime would increase the Syrian GDP but decrease per person income. Figure 3.7 shows the outcomes of the alternative scenarios. Both migration restriction scenarios show a relatively smaller GDP loss compared with the baseline. For instance, the GDP loss by the 20th year is about 670 percent of the annual pre-conflict GDP when all migration is restricted, and about 760 percent when mobility is free. In contrast, the average aggregate real wage losses amount to 535 percent of the average annual pre-conflict wage in the former, and only 433 percent in the baseline. This contrast is intuitive in this simple framework. Migration restrictions keep the labor force larger despite the additional casualties. This also increases labor per unit of capital, reducing marginal productivity and wages. As a result, each worker receives a smaller wage, but in aggregate, production increases because there are more workers. In a more complex, less stylized framework where, for example, trapped labor might be demotivated or actively resist supporting economic activity (for example, through strikes or major productivity slowdowns), it is not clear that we could not observe both a fall in GDP and in wages.

Figure 3.7: Dynamics of Impact under Different Migration Restriction Scenarios (Baseline: Free Movement)
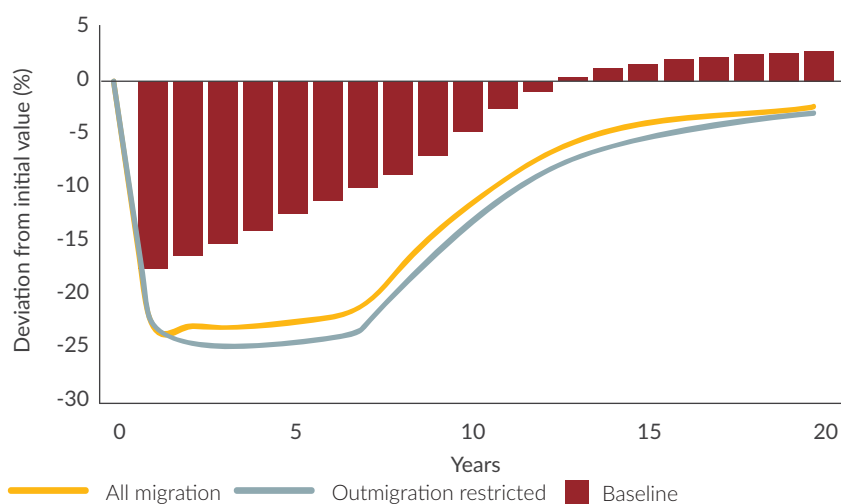

CUMULATIVE CHANGE IN GDP

CUMULATIVE CHANGE IN WAGES

All migration restricted   Outmigration restricted   Baseline

PRESENT VALUE OF FUTURE WAGES

All migration   Outmigration restricted   Baseline

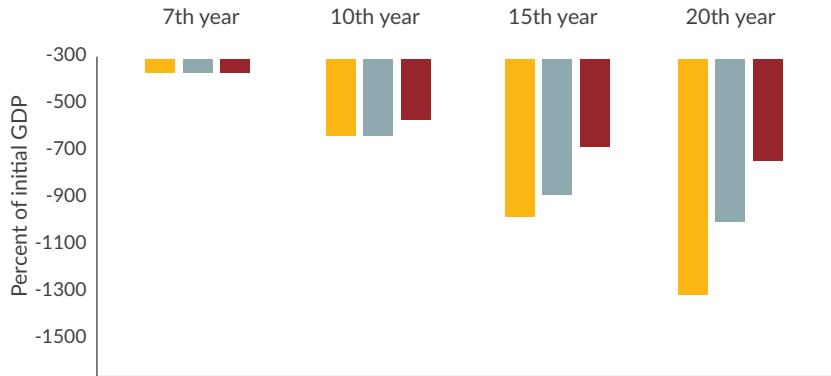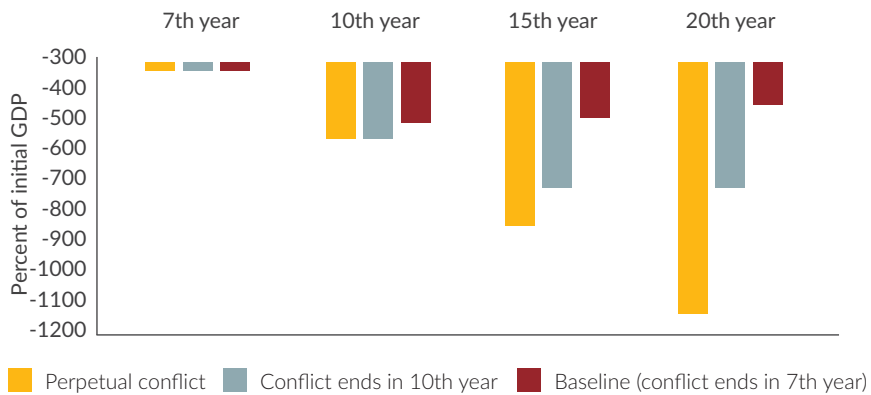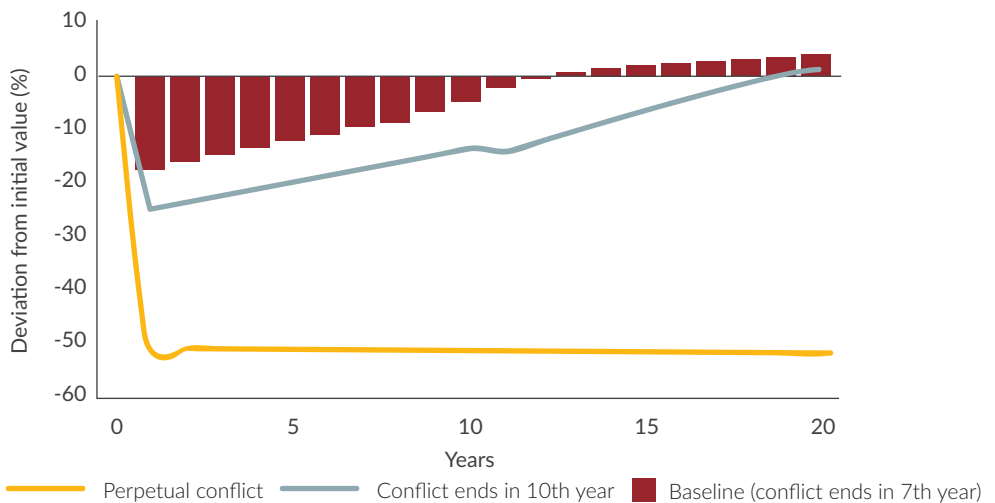## *What If…? The Lingering Impact of a Protracted Conflict*

How will the conflict's impact on the Syrian economy evolve if the conflict does not stop in 2017? The baseline simulations assumed that the conflict ends in 2017. Alternative conflict-end scenarios are considered to provide a benchmark for the possible evolution of the conflict's impact on the Syrian economy. Thus, two alternative scenarios are shown: the conflict ends in its 10th year (2021) and the conflict does not end in the near future. In both cases, shocks and parameters are the same as in the baseline specification.

With protracted conflict, economic outcomes continue to deteriorate. In the baseline, where conflict ends by the end of the sixth year, GDP recovers by about 20 percentage points (as a share of pre-conflict GDP) by the 10th year (table 3.4). In comparison, it continues to deteriorate in the alternative conflict-end scenarios. In both alternative scenarios, GDP reaches a level that is about 67 percent less than the pre-conflict level by the 10th year. In the case of perpetual conflict, it reaches about 69 percent less than pre-conflict GDP by the 20th year. These scenarios show that as the conflict persists, its impact on current variables increases over time, but at a decreasing rate. Several factors drive this slowdown. As conflict-related damage takes place in certain geographic areas and the additional years of the conflict are assumed to have the same pattern, the economic base affected by the conflict shrinks over time. Migration drains the labor force in conflict-affected regions and the capital stock reaches a stable level with new damage and investment ratios. Therefore, the economy converges to a new equilibrium, and adjustment slows, compared with the initial years when the adjustment is rapid.

The longer the conflict persists, the slower the recovery would be once the conflict ends. Simulations show that despite the moderation in the rate at which the conflict affects economic outcomes, its effects become more persistent. When the conflict ends in its sixth year, GDP recoups about 41 percent of the remaining gap with its pre-conflict level within the next four years. In comparison, it recoups only 28 percent of the gap in four years if it ends in its 10th year. The total loss in GDP reaches 760 percent of the annual pre-conflict GDP by the 20th year in the baseline (figure 3.8). With a perpetual conflict, this loss stands at 1,320 percent. When the conflict ends in the 10th year, the present value of future wages recovers back to pre-conflict levels by the 20th year. In the case of a perpetual conflict, it never recovers. Simulations also show that outmigration doubles between the sixth year of the conflict and the 20th year. Thus, the supply of migrants will not cease as long as there is conflict.

Table 3.4: Economic Outcomes under Various Conflict End-Date Scenarios
(Migration in millions; other variables in comparison to their pre-conflict values in
percentage terms)

	Conflict								
	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	10th Year	15th Year	20th Year
BASELINE (CONFLICT ENDS IN 6TH YEAR)									
Investment	-83.18	-81.77	-80.61	-79.58	-78.66	-77.80	-13.77	-7.31	-6.50
Outmigration	0.81	0.70	0.63	0.58	0.53	0.49	0.00	0.00	0.00
Wages	-54.99	-54.81	-54.70	-54.64	-54.60	-54.57	-23.53	10.31	8.55
GDP	-58.34	-60.60	-62.20	-63.42	-64.38	-65.15	-42.38	-13.16	-11.12
CONFLICT ENDS IN 10TH YEAR									
Investment	-83.18	-81.77	-80.61	-79.58	-78.66	-77.80	-74.84	-14.83	-7.80
Outmigration	0.81	0.70	0.63	0.58	0.53	0.49	0.00	0.00	0.00
Wages	-54.99	-54.81	-54.70	-54.64	-54.60	-54.57	-54.49	-17.22	11.38
GDP	-58.34	-60.60	-62.20	-63.42	-64.38	-65.15	-67.10	-40.00	-14.37
PERPETUAL CONFLICT									
Investment	-83.18	-81.77	-80.61	-79.58	-78.66	-77.80	-74.84	-71.82	-69.36
Outmigration	0.81	0.70	0.63	0.58	0.53	0.49	0.37	0.26	0.19
Wages	-54.99	-54.81	-54.70	-54.64	-54.60	-54.57	-54.49	-54.39	-54.31
GDP	-58.34	-60.60	-62.20	-63.42	-64.38	-65.15	-67.10	-68.23	-68.75

Figure 3.8: Dynamics of Impact under Various Conflict End-Date Scenarios

CUMULATIVE CHANGE IN GDP

CUMULATIVE CHANGE IN WAGES

Perpetual conflict   Conflict ends in 10th year   Baseline (conflict ends in 7th year)

PRESENT VALUE OF FUTURE WAGES

Perpetual conflict   Conflict ends in 10th year   Baseline (conflict ends in 7th year)

A Syrian refugee family, from Aleppo, staying under a shelter during a rainy day on March 8, 2014, at Uskudar in Istanbul.
Photo Credit: Bulent Kilic/AFP/Getty Images.

CONCLUDING REMARKS

CONCLUDING REMARKS

As this report was being prepared, the conflict was still active. By the end of March 2017, conflict was still active in large number of fronts, and despite much efforts brokered by many parties, including those of the international community, a stabilization and resolution path out of the conflict remained elusive.

The economic and social impacts of the conflict will continue to unfold, albeit with different magnitude and composition. The brief account outlined in this report stressed the combination of several risk factors that contributed to the onset, duration, and intensity of the conflict. These included a mass popular mobilization spurred by the spread of the Arab Spring to Syria in 2011, a larger regional context in which armed rebellion was made feasible and was kept going by the support of various powers, and the increasingly sectarian character of the conflict, which made credible commitments to a reasonable resolution impossible. Whereas the first two factors may be deemed passé as of now, the last factor is not. More importantly, the economic and social impacts of the conflict may in turn determine the future path of the conflict.

The importance of economic factors in shaping the outcomes on the ground has increased. An important question that arises from the analysis thus far is the following: in what direction could the economic impact of the conflict affect peace and stability? It is obviously very difficult to answer this question. However, it is unambiguous that the conflict has increased regional inequalities, war economy, and rent seeking, and further depressed civil liberties and polarized the Syrian society. Although these factors played only an enabling role for the onset of the current conflict, with much worsened outcomes now, they could play a more prominent role in further complicating a reasonable stabilization.

The economic and social impacts of the conflict also amount to immense practical challenges. Syria will eventually have to overcome a multitude of urgent economic and social challenges to promote peace and stabilization. The conflict has cast a wide swath of the population into poverty, and reoriented several million toward livelihood sectors that will not be sustainable in a post-war economy. A whole generation of children has received inadequate education. This, coupled with a significant brain-drain, has caused a dramatic decline in Syria's human capital. The immense spectrum of needs arising from the conflict will require a strident response. Planning, coordination, and implementation arrangements will need to reflect the dual challenge of providing immediate peace dividends and humanitarian support to those in need, while also strengthening the national systems and capacities that are necessary to eliminate poverty, promote development objectives, and help to implement a new vision for Syria.

APPENDIX A. METHODOLOGY AND ASSESSMENTS

Methodology of Physical Damage Assessments

Physical damage assessments were conducted in two stages:

a) *City-level assessments*. These provided an assessment of physical damage for the 10 cities (Aleppo, Dayr az-Zawr, Raqqa, Dar'a, Idlib, Douma, Kobane, Tadmur (Palmyra), Homs, and Hama) as of January 2017.

b) *Governorate-level assessments*. These provided modified extrapolations of city-level assessments to estimate physical damage for the country's eight most conflict-affected governorates (Aleppo, Homs, Hama, Dayr az-Zawr, Raqqa, Dar'a, Idlib, and Rif Dimash).

In both stages, the following sectors were included in the analysis: housing; water and sanitation (public network), energy (public network), health (public facilities), education (private and public facilities), and transportation (primary road network).

City-Level Assessments

The baseline for all six sectors was created and refined for Aleppo, Dar'a, Homs, Hama, and Idlib cities during previously conducted Damage and Needs Assessments (DNAs). A baseline of facilities was created for the five cities not previously covered in DNA efforts (Dayr az-Zawr, Douma, Kobani, Raqqa, and Tadmur). Table A.1 provides the number of facilities assessed per sector by city.

Table A.1: Number of Facilities Assessed per Sector, by City

City	WASH	Power	Housing	Health	Education	TOTAL FACILITIES	Road length
Aleppo	198	333	88,384	121	475	**89,511**	3,123,681
Dar'a	26	10	9,443	25	137	**9,641**	224,672
Dayr az-Zawr	23	40	5,712	42	120	**5,937**	479,199
Douma	11	17	5,578	12	49	**5,667**	128,462
Hama	99	396	22,977	47	217	**23,736**	610,216
Homs	26	274	42,017	90	287	**42,694**	1,113,961
Idlib	30	70	5,896	15	56	**6,067**	181,346
Kobani	24	3	5,673	3	18	**5,721**	166,665
Raqqa	13	37	7,810	25	43	**7,928**	688,997
Tadmur	7	10	1,364	4	24	**1,409**	271,047
TOTAL	457	1,190	194,854	384	1,426	**198,311**	6,988,246

Baseline identification and remote-based verification of the damage and functionality of facilities was conducted through examination of (1) commercial half-meter resolution imagery, (2) social media data, and (3) publicly available sources of information, including Syrian government reports and nongovernmental organization documents. Employing a multi-pronged approach allowed for cross-validation of data and cycles of refinement. In addition, remote sensing data, such as Visible Infrared Imaging Radiometer Suite day/night band light detection imagery, was consulted as part of the analytic output testing process for the power sector. The physical status of each facility was classified as follows:

• *Destroyed*, if damage exceeds 40 percent of the structure
• *Partially damaged*, if damage is less than 40 percent of the structure
• *No damage*, if damage is at 0 percent.

The operational status of each facility is also provided—functioning or not functioning—as source reporting is available.

Governorate-Level Assessments

As the methodology developed for the city-level analysis relies on detailed observations and labor-intensive analysis, repeating the same methodology for the entire Syrian landscape was prohibited by timing and resource-constraints. Thus, the governorate-level assessment employed extrapolation of all six sectors to provide damage results for the eight governorates in which the 10 surveyed cities are located. Baseline statistics came from the following sources:

• Housing and water, sanitation, and hygiene (WASH): access to the public WASH network by residential units, from the Syrian Government 2004 Housing Census).

• Power: data on major power plants from Syrian General Institute for Electricity Generation reports.

• Education: data on primary and secondary schools from the Syrian Center for Statistics 2010 Survey of the Syrian Education System.

• Health: data on private hospitals, public hospitals, medical centers, and specialized medical centers from the Syrian Center for Statistics 2010 Survey on Syrian Medical Facilities.

• Transportation: data on main roads, highways, and primary roads from OpenStreetMap.

The extrapolation process required statistics to be compiled at the district level (the administrative unit immediately below governorate); however, the

education and schools data available from the Syrian Center for Statistics are only provided at the governorate level.

Conflict dynamics analysis at the city and district levels facilitated extrapolation of city-level damage results to the governorate level. Specifically, this entailed creating a conflict-induced damage inference matrix; applying the matrix to cities to calculate composite sector damage estimates for high-, medium-, and low-conflict environments; applying the matrix to districts to first assign expected high, medium, and low conflict-induced damage levels, and next transfer corresponding city-level composite damage percentages to baseline figures for the district; and finally, aggregating these district-level estimates to the governorate level.

The conflict-induced damage inference matrix was developed to estimate high, medium, and low damage that take into account three major types of conflict tactics as well as their intensity. In addition, it factors in observed resilience in the country by including reconstruction (undertaken by a variety of local actors) as an indicator type (table A.2).

Table A.2: Conflict-Induced Damage Inference Matrix

Indicator Type	High Prevalence	Moderate Prevalence	Low Prevalence
Low intensity conflict	Widespread (3)	Targeted (2)	Close to none (1)
Airstrikes	Widespread (3)	Targeted (2)	Close to none (1)
Heavy Artillery	Widespread (3)	Targeted (2)	Close to none (1)
(Tanks, Mortars, etc.)			
Reconstruction	Extensive (-3)	Moderate (-2)	Limited or none (-1)

Any city or district with less than 2 points was assigned a low damage estimate; 3 to 5, a medium damage estimate; and 6 or above, a high damage estimate. The damage inference matrix was applied to the 10 cities in the study, yielding the following damage category groupings:

- *High damage:* Aleppo, Dayr az-Zawr, Douma, Idlib, and Tadmur
- *Medium damage:* Dar'a, Kobani, Raqqa, and Homs
- *Low damage:* Hama.

Finally, the city composite estimates were used to calculate district- and governorate-level damage. Of 42 districts located in the eight governorates, 29 districts were classified as high damage, eight districts as medium damage, and five districts as low damage. These composite percentages of damage were applied to the baseline figures for each district, at the high, medium, or low level as appropriate. This generated figures for housing, health, and education. The composite percentages for housing were also applied to the transportation sector (using total road length for the major road categories of highway, trunk, and primary roads as the baseline), as well as to the WASH sector (using total number of households accessing the public network as the baseline).

APPENDIX B. SECTORAL SITUATION REPORTS

Table B.1: Situation Report: Water and Sanitation Infrastructure

City	Source	Water Availability	Damages	Coping Mechanisms
Aleppo	150 Public and 300 Private Wells	As of 15 February 2017, no residents in Aleppo have accessed water via the public network since 14 January	Pumping stations and piping network heavily damaged, especially in eastern and southern neighborhoods	Residents are dependent on wells and trucks
Dara'a	Wells and Water Trucks	Public water network is not fully functional; in opposition-held Dar'a al-Balad, no information available on water availability	Damage to two pumping stations and connecting pipelines	Wells and trucks, in absence of public networks; trucks face difficulty in entering opposition held al-Balad
Dayr az-Zawr	Partially functioning public network	Access to public network is limited; al-Joura and al-Qusour neighborhoods receive water once every week for a few hours, on average	Largest water treatment station and most pumping stations are damaged	Wells, Euphrates river and water tank
Douma	Wells and hand pumps	Public water network is cut off.	Pipeline likely to be heavily damaged because of frequent and heavy bombings, some pumping stations damaged.	Small scale wells and hand-pumps, few trucks
Hama	Public Network	90-100% coverage through public network	Public network remains undamaged and functioning, but the main line outside the city is damaged	0-9% use truck or alternative sources.
Homs	N/A	N/A	Partial damage	Availability of 60 wells acts as a back-up
Idlib	Public Network	No consistent water supply from public network; Rotating schedule, with each neighborhood receiving water every 12 days	Piping network damages, lack of electricity	Trucks and wells
Kobani	Partially functioning public network; city relies on 15 wells to supply piped network	Some neighborhoods are disconnected from public network; supply limited in time and pressure in connected neighborhoods	Pumping stations and tanks are not accessible, due to ISIS takeover and are likely partially damaged	Trucks and wells
Raqqa	Public Network	Decreased/limited supply	Electricity and fuel shortages, stolen equipment; water outages for long periods due to air strikes, likely future damages to pipeline through frequent airstrikes	N/A
Tadmur	N/A	No access to public network	Extensive damage to piping network since the start of conflict and wells likely remains partially damaged; likely more damages due to latest ISIS takeover	N/A

Table B.2: Situation Report: Power Infrastructure

City	Public Grid (hours of electricity hours per day)	Commercial and Private Generators	Comments
West Aleppo	0-2 hours (January 2017). The transmission line connecting Aleppo city to the grid in Hama has been cut. Most public infrastructure in Aleppo governorate has been destroyed or disconnected.	42%. Commercial and private generators have become an important source of electricity. 108 private generators surveyed provided on average 8–10 hours of electricity per day.	West Aleppo's private generators are regulated through the city's public electricity administration and are legally obliged to provide a minimum of 10 hours of electricity per day.
East Aleppo	0 hours. The eastern districts of the city have been largely destroyed and cut off from public services.	No data available.	Before the recapture by government forces, residents relied on a combination of public and private generators, as well as improvised solutions, such as solar energy.
Damascus	4-12 hours. Reports suggest an average of 12 hours of electricity a day, with peripheral neighborhoods faring worse: Qudsaya 6 hours, downtown Mezzeh 4 hours, Sahnaya and Barza 2 hours and Artouz 0 hours.	No data available.	Data for Damascus vary heavily by neighborhoods, especially between central districts and outlying suburbs.
Douma	0 hours.- Douma has been cut from the public grid.	8% on average from private and commercial generators.	Private and commercial generators reportedly rely on the now disused public electricity infrastructure.
Hama	1-9 hours. Most neighborhoods in Hama receive between 5 and 9 hours of electricity from the public grid per day.	Commercial electricity generators are available and in use.	N/A
Masyaf	4 hours.	No data available.	N/A
Salamiyeh	2 hours.	No data available.	N/A
Tadmur (Palmyra)	0 hours. Following the recapture of the city by ISIS in December 2016, electricity has been cut.	Generators operate to support water wells and core infrastructure.	The city experienced few power outages prior to its initial capture by ISIS in May 2015.
Latakia	1-4 hours. Reports in January 2017 of total blackouts for entire areas (Dator and Ramlat Shmali), and 20 to 22 (Dahiet al-Assad, al-Tabiyat, Saliba) hours of rationing for most other neighborhoods. The situation is reportedly worse in the countryside. Syria Direct averages outages at 1 hour of electricity per day.	No data available.	N/A
Tartus	6 hours. Officials from Tartus claim 1.5 hours of electricity alternating with 4.5 hours of rationing (December 2016).	No data available.	N/A
Idlib	Up to 1.2 hours for most neighborhoods, except ad-Dabit (4 hours) and Market/City Center (2 hours).	Roughly 75% of Idlib residents own or subscribe to 29 private electricity generators (range 55% in al-Arbaeen to 95% in As-Souq and Hadiqat al-Basel). Operators are allowed to provide up to 4.5 hours per day (July 2016), 18.75%.	Idlib's public electricity system relies on 11 public generators administered by the opposition's Public Services Administration. The city has been cut off from the central state electricity grid.
Raqqa	8 hours. The city receives on average 8 hours of electricity primarily from Al-Furat Hydroelectric Dam.	No data available.	N/A
Kobani	24 hours. Local sources report that by January 2017, residents received 24 hours of electricity from the public grid.	No data available.	N/A

Table B.3: Situation Report: Health Care Facilities

City	Health Status	Alternative Arrangements/Other Efforts
Aleppo	• 58% of facilities in Aleppo have been destroyed or damaged. • 84% of facilities in Eastern Aleppo were reported to be non-functioning.	• Eastern Aleppo is heavily reliant on temporary health points and mobile clinics • IDP camps in outskirts only have access to mobile clinics.
Dara'a	• 65% of facilities are partially damaged • Both government-controlled Dar'a al-Mahatta and opposition-controlled Dar'a al-Balad experience shortages of staff. • Hospitals in both areas are under threat.	• In Dara'a Al-Mahata, government attempts to re-staff hospitals and provide new equipment. • In Dara'a Al-Balad, support is received from medical NGOs. • Some medicines and equipment were also smuggled from government-controlled areas.
Dayr az-Zawr	• 88% of facilities have been destroyed or damaged • six facilities are currently functioning • shortage of medicines and medical supply	• Patients in need from opposition-controlled areas were transported to Turkey or regional hospitals. • Syrian government has reportedly air dropped a ton of medical aid into western Dayr az-Zawr • International NGOs have been providing medical supplies to the city via airdrop since the start of the siege in 2014
Douma	• All facilities partially damaged and only two facilities functioning in the city	N/A
Hama	N/A	N/A
Homs	N/A	N/A
Idlib	• Facilities operate with limited capacity; of 15 identified facilities, 9 remain partially damaged, 3 are destroyed, and 3 are intact.	• There are evidences of opening of new facilities and also staff hiring announcements
Kobani	• Two out three hospitals are functioning, one is experiencing shortages in medical supplies and equipment	• The two functioning hospitals were rebuild/repaired and re-opened.
Raqqa	• Before crisis, private clinics provided most of Raqqa's health care services; there was only one large public medical facility in the city	• International aid organizations began providing health services, but they were forced to stop following the takeover of the city by ISIS.
Tadmur	• Under ISIS, nearly daily attacks damaged/destroyed all medical facilities	N/A

Table B.4: Situation Report: Education Facilities

City	Education Status	Alternative Arrangements/Other Efforts
Aleppo	• 53% of schools are damaged; 10% completely destroyed • Nearly all schools in Eastern Aleppo are destroyed	• UNESCO and UNICEF have supported the construction and rehabilitation of 23 schools between December 2016 and January 2017
Dara'a	• 15% of facilities are destroyed and 37% are partially damaged.	N/A
Dayr az-Zawr	• 62% of the facilities show signs of damange	• Government has re-opened some schools but in ISIS controlled areas, due to security threats, teachers and students stay out of schools.
Douma	• 90 percent of all education facilities are partially damaged • Schools remain vulnerable: about 10% are used as bomb shelters	N/A
Hama	N/A	N/A
Homs	N/A	N/A
Idlib	• 68% of Idlib's schools have sustained partial damage	• According to a February 2017 statement, 73 percent of Save the Children-supported schools in Idlib and Aleppo have suffered severe airstrike damage.
Kobani	• 12 schools show no signs of damage, 2 have been destroyed, and 4 have been partially damaged.	• Local rehabilitation efforts have been ongoing in the educational sector since April 2015. • 15 schools were rehabilitated, and accommodate 50,000 students as of January 2017.
Raqqa	• Of the 43 schools identified, 16% have been destroyed, and 63% registered as partially damaged	• In addition to al-Furat University, the Islamic State is operating as many as 24 schools.
Tadmur	• 83% of schools are partially damaged • As of January 2017, no schools or educational facilities are reported operational within the city	N/A

APPENDIX C. TECHNICAL SPECIFICATIONS OF THE SIMULATION MODEL

A. Key Features of the Model

(i) Workers:

- In the model, there are 14 regions within Syria and a stylized outside region to account for emigration.

- The agents choose a region to live and work in every period. If they choose to move they have to pay a moving cost. The moving cost parameter has a fixed and a random component. It closely follows the Alix-Garcia, Artuc and Onder (2017) specification. (We calibrate the moving cost parameters using Artuc, Lederman and Porto (2015) estimates).

- An agent can be employed (i.e. active) or unemployed (i.e. inactive). Active workers get the wage determined by market conditions, while inactive workers get a fixed utility.

- All workers within the same region with the same status are identical. We abstract from education, gender, age and other worker characteristics.

- When a worker arrives to a new region, she is initially inactive. She searches for a job and gets matched to a vacancy in the region with some probability. The pool of searchers are determined by the number of new arrivals, new separations, and unmatched workers from previous period. The match probability is equal to the number of searchers divided by the number of matches.

- The number of matches are determined by a Cobb-Douglas matching technology, as it is the standard in the literature.

- The separation probability is assumed to be equal to capital depreciation rate (for simplicity).

- The matched worker-employer pair constitutes a factor, i.e. a job. This factor produces an output together with the capital factor via a Cobb-Douglas production function.

- The employer-employee match receives its marginal product. The employer and the employee share this marginal product equally.

- The agents can be risk averse, with a CRRA utility function.

- The workers face a risk of death and the utility is assumed to be zero in the case of death. The probability of death, δ, is specific to regions. Conflict can change this parameter.

- We normalize the number of agents to one for computational simplicity. Hence, the agents are in a continuum with measure one. (This continuum accounts for agents in all regions including the outside region, both active and inactive.)

- The agents in the outside region receive a fixed utility in every period. This fixed utility is exogenous. There is no active-inactive distinction outside Syria. We do not model capital, search or matching outside Syria.

(ii) Capital:

- The potential supply capital is fixed in each region. Similar to workers, we assume a fixed continuum for capital.

- Similar to the assumption on workers, there are two types of capital: active and inactive.

- In each period, some capital depreciates and becomes inactive. This depreciation rate is different in each region, and can be affected from the conflict.

- After becoming inactive, capital can be activated by investment, which requires a fixed and random cost.

- In each period inactive capital receives a random investment cost. If this investment cost is larger than the value difference of active and inactive capital, the capital stays inactive. If not, the capital becomes active after paying the cost. This decision is repeated for every unit of inactive capital in every period.

- Capital receives a rent equal to its marginal product. The value of capital is calculated using the expected rents, probability of depreciation and the distribution of investment shocks, similar to the workers' problem.

(iii) Vacancies:

- The cost of posting vacancy is increasing with the number vacancies.

- The value of posting a vacancy is the probability of a match times the value of the match.

- The probability of separation is fixed for each region but can be affected from conflict.

- Vacancies are created until the vacancy posting cost is equal to the expected value.

B. Introduction of Notation

(i) Subscripts and superscripts

- i: region superscript, $i = 1, 2, ..., N$. Region N denotes migrants.

- a: employed worker or active capital subscript.

- u: unemployed worker or inactive capital subscript.

- K: subscript for capital related variables.

- L: subscript for worker related variables.

- E: subscript for employer related variables.

- t: time subscript.

(ii) Parameters

- α: Cobb-Douglas production function labor share parameter.

- A_t^i: Cobb-Douglas production function technology parameter.

- σ: CRRA risk aversion parameter.

- β: discount factor.
- C^{ij}: moving cost friction from region i to region j.
- C_K: investment cost in region i.
- $c_{v,1}$ and $c_{v,2}$: parameters of the vacancy posting cost function.
- ν: regional moving cost shock (ϵ) scale parameter.
- ϕ_u and ϕ_f: fixed utility of inactive and migrant workers.
- ψ: matching function technology parameter.
- $\delta_{K,t}^i$: depreciation rate of capital in region i.
- $\delta_{E,t}^i$: separation probability in region i.
- $\delta_{L,t}^i$: death probability in region i.

(iii) Random Shocks

- ϵ_t^i: regional moving cost shock (extreme value type II with scale ν). These shocks are individual specific and iid random with no memory.
- ε_t: investment cost shock (extreme value type II with scale 1).

(iv) Variables

- y_t^i: output in region i.
- $L_{a,t}^i$: number of type active (employed) workers in region i.
- $L_{u,t}^i$: number of type inactive (unemployed) workers.
- $K_{a,t}^i$: amount of active capital.
- $K_{u,t}^i$: amount of inactive capital.
- K_t^i: amount of total (i.e. active plus inactive) fixed capital in region i.
- μ_t^i: number of new employee-employer matches in region i.
- w_t^i: real wage of active workers in region i.
- r_t^i: real rental rate of active capital.
- u_t^i: instantaneous utility of active workers.
- $V_{L,a,t}^i$: present discounted value of active workers.
- $V_{L,u,t}^i$: present discounted value of inactive workers.
- $V_{K,a,t}^i$: present discounted value of active capital.
- $V_{K,u,t}^i$: present discounted value of inactive capital.
- $V_{E,t}^i$: present discounted value of matched employer.
- $P_{K,t}$: probability of investment in region i for a unit of active capital.
- I_t^i: investment in region i

- $m_{a,t}^{ij}$: probability of moving from region i to region j for an active worker.

- $m_{u,t}^{ij}$: probability of moving from region i to region j for an inactive worker.

- $C_{v,t}^i$: cost of posting a unit of vacancy in region i.

- v_t^i: the number of vacancies in region i.

B. The Model

Assume that there are $N-1$ regions in the economy. The final region, N, represents outside of the country. In each region, there is a stock of capital and workers. We assume that all entrepreneurial activity is performed by workers, and we do not consider a separate agent type for entrepreneurs or capital owners.

(i) Production and factor prices

The output in region i is equal to

$$y_t^i \;=\; A_t^i (L_{a,t}^i)^\alpha (K_{a,t}^i)^{1-\alpha}, \tag{1}$$

where $L_{a,t}^i$ is the number of active workers, $K_{a,t}^i$ is the amount of active capital, and A_t^i is the technology parameter.

Active worker-employer pairs and capital owners receive their marginal products. We assume that workers and employers share this marginal product on an equal basis, thus each receive $w_t^i = (1/2)\alpha A^i L_{a,t}^i{}^{\alpha-1} K_{a,t}^i{}^{1-\alpha}$. Similarly, the rental rate is equal to the marginal product of capital $r_t^i = (1-\alpha)A^i L_{a,t}^i{}^\alpha K_{a,t}^i{}^\alpha$.

(ii) Workers

The number of active (i.e. employed) workers living in region i is denoted as $L_{a,t}^i$ and the number of inactive (i.e. unemployed) workers is denoted as $L_{u,t}^i$. All inactive workers look for jobs and they get matched to an employer with probability $(\frac{\mu_t^i}{L_{u,t}^i})$ where μ_t^i is the endogenous number of matches. Once a worker is matched to an employer, she becomes active. The match breaks when the worker moves to another region or with a separation shock that arrives probability $\delta_{E,t}^i$. We assume that this probability is specific to regions and is affected from conflict.

The workers have a CRRA utility function with risk parameter equal to σ. The utility of active workers is equal to:

$$u_t^i = \frac{(w_t^i)^{1-\sigma}}{1-\sigma}, \tag{2}$$

while the inactive workers receive a fixed constant utility $u_t^i = \phi_u$ and the migrant workers in region N receive a fixed utility $u_t^i = \phi_f$. Note that there is no active-inactive distinction for the migrants (i.e. refugees). Workers can choose a region in every time period, but they have to pay a fixed cost C^{ij} and a random cost ϵ_t^j when moving from region i to j. The random component is distributed Gumbel with scale ν and mean zero. The fixed component of the moving cost is zero for stayers, i.e $C^{ii} = 0$.

The number of active workers moving from i to j is denoted as $m_{a,t}^{ij}$, and the number of inactive workers moving from i to j is denoted as $m_{u,t}^{ij}$.

Thus the number inactive workers in a region at time t can be calculated as

$$L_{u,t}^i = \sum_{i \neq j} \left(m_{a,t-1}^{ji} L_{a,t-1}^j + m_{u,t-1}^{ji} L_{u,t-1}^j \right) + m_{u,t-1}^{ii} L_{u,t-1}^i + \delta_{E,t}^i m_{a,t-1}^{ii} L_{a,t-1}^j, \tag{3}$$

and the number of active workers can be calculated as

$$L_{a,t}^i = m_{a,t-1}^{ii} L_{a,t-1}^i + \mu_t^i. \tag{4}$$

The workers face the risk of death with probability $\delta_{L,t}^i$. We assume that there is a fixed continuum of workers. Although this death probability does not affect the number of workers, it affects the decision of all agents significantly. For example, when the death probability increases in a region, the workers leave the region at a faster pace and are less likely to make investments in that particular region. This probability enters into the model like an exogenous discount factor.

The value of inactive workers is equal to

$$V_{u,t}^i = \phi_u + \beta(1 - \delta_{L,t}^i) E \left(\left[1 - \frac{\mu_t^i}{L_{u,t+1}^i} \right] (V_{u,t+1}^i - \nu \log m_{u,t}^{ii}) + \frac{\mu_t^i}{L_{u,t+1}^i} (V_{a,t+1}^i - \nu \log m_{a,t}^{ii}) \right), \tag{5}$$

and the value of an active worker is equal to

$$V_{a,t}^i = u_t^i + \beta(1 - \delta_{L,t}^i) E \left(\left[1 - \delta_{E,t}^i \right] (V_{a,t+1}^i - \nu \log m_{a,t}^{ii}) + \delta_{E,t}^i (V_{u,t+1}^i - \nu \log m_{u,t}^{ii}) \right). \tag{6}$$

The probability of moving for an inactive workers is defined as

$$m_{u,t}^{ij} = \frac{EV_{u,t+1}^j - EV_{u,t+1}^i - C^{ij}}{\sum_k \left(EV_{u,t+1}^k - EV_{u,t+1}^i - C^{ik} \right)}, \tag{7}$$

and the probability of moving for an active workers is defined as

$$m_{a,t}^{ij} = \frac{EV_{u,t+1}^j - EV_{a,t+1}^i - C^{ij}}{1 + \sum_{k \neq i} \left(EV_{u,t+1}^k - EV_{a,t+1}^i - C^{ik} \right)}. \tag{8}$$

(iii) Capital

The active capital $K_{a,t}^i$ and inactive capital $K_{u,t}^i$, add up to the total potential capital in region i:

$$K_t^i = K_{a,t}^i + K_{u,t}^i. \tag{9}$$

The total potential capital is fixed, and does not change over time. The increase in the active capital is equal to the investment minus depreciation

$$K_{a,t}^i = (1 - \delta_{K,t}^i) K_{a,t-1}^i + I_t^i, \tag{10}$$

where $\delta_{K,t}^i$ is equal to the region specific depreciation rate which can be affected from conflict.

The present discounted value of inactive capital is equal to

$$V^i_{K,u,t} = (1 - \delta^i_{L,t}) \left(\beta EV^i_{K,u,t+1} - \log(1 - P^i_{K,t}) \right), \tag{11}$$

where r^i_t is the rental rate for the capital, β is the discount factor and $P^i_{K,t}$ is the probability of investment. After paying the fixed cost C_K and a random cost ε_t (drawn from a mean zero Gumbel with scale one), the inactive capital can be activated to enter into production.

Thus the probability of investment is equal to

$$P^i_{K,t} = \frac{\exp(EV^i_{K,a,t+1} - EV^i_{K,u,t+1} - C_K)}{1 + \exp(EV^i_{K,a,t+1} - EV^i_{K,u,t+1} - C_K)}, \tag{12}$$

and the total investment is equal to

$$I^i_t = P^i_{K,t-1} K^i_{u,t-1}. \tag{13}$$

Then the value of active capital is equal to

$$V^i_{K,a,t} = r^i_t + (1 - \delta^i_{L,t})\beta \left((1 - \delta^i_{K,t}) EV^i_{K,a,t+1} + \delta^i_{K,t} EV^i_{K,u,t+1} \right). \tag{14}$$

(iv) Vacancies and matching

The value of a matched employer is equal to

$$V^i_{E,t} = w^i_t + \beta(1 - \delta^i_{L,t})(m^{ii}_t - \delta^i_{E,t}) EV^i_{E,t+1}, \tag{15}$$

where $\delta^i_{L,t}$ is the probability of death, $\delta^i_{E,t}$ is the probability of exogenous separation, and m^{ii}_t is the probability of the matched worker staying in the region.

We assume that the cost of posting vacancies is increasing with the number of vacancies, v^i_t :

$$C^i_v, t = c_{v,1}(v^i_t)^{c_{v,2}}, \tag{16}$$

where $c_{v,1}$ and $c_{v,2}$ are the parameters of the cost function.

Employers will create vacancies until the cost of posting the vacancy is equal to the expected value. Hence, we can set the value equal to the cost:

$$c_{v,1}(v^i_t)^{c_{v,2}} = \frac{\mu^i_t}{v^i_t} EV^i_{E,t}, \tag{17}$$

where μ^i_t is the number of matches. Then the equilibrium number of vacancies is equal to

$$v^i_t = \left(\frac{\mu^i_t}{c_{v,1}} EV^i_{E,t} \right)^{\frac{1}{1+c_{v,2}}}. \tag{18}$$

The number of matches is generated with a Cobb-Douglas matching technology

$$\mu^i_t = \psi(v^i_t)^{0.5}(L^i_{u,t})^{0.5}, \tag{19}$$

where ψ is the matching technology parameter.

D. Solution Algorithm

The solution algorithm has two components: (i) solution of the initial steady state and (ii) solution of the transition.

(i) Initial Steady State:

We assume that all t and $t+1$ variables have identical values for the steady state, and use the subscript $t=0$.

Guess the values, $V_{L,a,0}^i$, $V_{L,u,0}^i$, $V_{K,a,0}^i$, $V_{K,u,0}^i$ and $V_{E,0}^i$, and factor allocations $L_{a,0}^i$, $L_{u,0}^i$, $K_{a,0}^i$, $K_{u,0}^i$ and v_0^i. Consider parameters of the model as given.

- Calculate wages and rental rates given $L_{a,0}^i$ and $K_{a,0}^i$

- Calculate probability of region changes, $m_{a,t}^{ij}$ and $m_{u,t}^{ij}$, given $V_{L,a,0}^i$ and $V_{L,u,0}^i$, for $i, j = 1, 2, .., N$

- Calculate investments I_0^i

- Calculate matches μ_0^i

- Calculate the implied factor allocation vectors, $\tilde{L}_{a,0}^i$, $\tilde{L}_{u,0}^i$, $\tilde{K}_{a,0}^i$, $\tilde{K}_{u,0}^i$ and $\tilde{v}_0^i$, using the calculated region change probabilities, investments, matches and guessed values

- Calculate the implied values, $\tilde{V}_{L,a,0}^i$, $\tilde{V}_{L,u,0}^i$, $\tilde{V}_{K,a,0}^i$, $\tilde{V}_{K,u,0}^i$ and $\tilde{V}_{E,0}^i$ using the calculated region change probabilities, investments, matches and guessed values

- Update the guessed values and factor allocations using the implied values and factor allocations

- Continue until the guessed values and guessed factor allocations are equal to the implied values and implied factor allocations

(ii) Transition:

This procedure is similar to the steady state solution. Rather than guessing the values for a single time $t = 0$, we need to guess the entire time series, $t = 1, 2, 3, .., T$. See Artuc, Chaudhuri and McLaren (2008) for details.

The parameters listed in section B are calibrated such that the steady state and transition solutions (at time $t = 7$) approximately give the descriptive statistics available for Syria.

E. Scenarios

- Scenario 1: Baseline, capital depreciation rate, $\delta_{K,t}^i$, casualty rate $\delta_{L,t}^i$, separation rate, $\delta_{E,t}^i$, increase and productivity A_t^i decrease for $t = 1, 2, 3, .., 7$. These changes are unanticipated by agents.

- Scenario 2: Only the capital depreciation rate, $\delta_{K,t}^i$, increases.

- Scenario 3: Only the probability of death, $\delta_{L,t}^i$, increases.

- Scenario 3: The productivity, A_t^i, decreases and the separation probability, $\delta_{E,t}$ increases.

- Scenario 4: The workers are risk neutral with $\sigma = 0$, this scenario is otherwise identical to baseline.

- Scenario 5: C^{ij} is very large for $j = N$ (migration cost is very large). Otherwise identical to the baseline.

- Scenario 6: Similar to the baseline, but C^{ij} is very large for every $i \neq j$.

- Scenario 7: The war ends in $t = 10$ rather than $t = 7$. Otherwise identical to the baseline.

- Scenario 8: Similar to the baseline, but the war continues perpetually.

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http://www.middleeasteye.net/in-depth/features/pictures-aleppo-artists-paint-pictures-revolution-war-city-walls-2075898635).

This report studies the economic and social impact of the armed conflict in Syria. Bringing together conflict-driven loss of lives, forced displacement, physical damages in capital, and overall economic collapse, it takes stock of the consequences brought about by one of the most brutal conflicts of our time.

The analysis extends our understanding of the Syrian conflict by focusing on the distinct roles played by physical destruction, casualties, and disruptions in economic organization in driving the economic and social impact of the conflict. Although visual effects, such as physical destruction, are more often noticed, the "invisible" effects, such as disruptions in economic networks, increased rent seeking, and the erosion of social trust, play a greater role in explaining the collapse in economic activity. The persistence of economic effects also differs across various channels. The economic impact of conflict-related casualties is much more persistent than that of other channels.

As this report was written, the Syrian conflict was ongoing in its sixth year. The report suggests that the longer the conflict lasts, the slower and more difficult the post-conflict recovery will be.

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