

Public Disclosure Authorized

SYRIA



ECONOMIC MONITOR

Lost Generation
of Syrians

Spring 2022



Public Disclosure Authorized

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP
Middle East & North Africa

Syria Economic Monitor

Lost Generation of Syrians

Spring 2022

Middle East and North Africa Region

© 2022 International Bank for Reconstruction and Development/The World Bank
1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

This work is a product of the staff of The World Bank. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be construed or considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved. Rights and Permissions This work is available under the Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO) <http://creativecommons.org/licenses/by/3.0/igo>.

All queries should be addressed to the lead author, at: gmele@worldbank.org.

Rights and Permissions

The material in this work is subject to copyright. Because The World Bank encourages dissemination of its knowledge, this work may be reproduced, in whole or in part, for noncommercial purposes as long as full attribution to this work is given.

Any queries on rights and licenses, including subsidiary rights, should be addressed to World Bank Publications, The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: pubrights@worldbank.org.

Cover photos courtesy of:

(top) *Doctor examines child malnutrition*. Credit: Mohammad Bash / Shutterstock

(center, left) *Town near Palmyra, Syria*. Credit: Fly_and_Dive / Shutterstock

(center, right) *Syrian refugees families from Kobani district*. Credit: Orlok / Shutterstock

(bottom) *Syrian refugees children studying in the classroom*. Credit: Tolga Sezgin / Shutterstock

Further permission required for reuse.

Publication design and layout by The Word Express, Inc.

TABLE OF CONTENTS

Acronyms	vii
Preface	ix
Executive Summary	xi
الملخص التنفيذي	xiii
1. The Conflict Context	1
2. Recent Economic Developments	7
Deteriorating economic situation	7
Persistent current account deficit and dwindling foreign reserves	11
Currency depreciations and surging inflation	14
Weakening fiscal position	19
Declining living standards and rising food insecurity	23
3. Outlook and Risks	25
Outlook	25
Risks	27
Special Focus: Demographic and Labor Market Consequences of the Syrian Conflict	31
Technical Appendix	37
Counterfactual GDP Calculations for Syria	37
Nowcasting Economic Activity Using Nighttime Lights	42
Connectedness between the Syrian and Lebanese Pounds	48
Average Exchange Rates for Syria	63
The Exchange Rate Pass-Through in Syria	65
References	73

List of Figures

Figure 1	Syria: Economic Development at a Glance	xiii
Figure 2	Conflict-Related Casualties in Syria by Event Year, 2017 and 2021	2
Figure 3	Change in Population Density, Syria, 2010–2020	2
Figure 4	Syrian Refugees by Hosting Countries	3
Figure 5	Internally Displaced Persons (IDPs)	3
Figure 6	Worldwide Governance Indicators, Syria	4
Figure 7	Actual and Counterfactual GDP, Syria	4
Figure 8	GDP Impact of the Syrian Conflict in the Mashreq Region	5
Figure 9	Night-Time Lights and GDP	9
Figure 10	Economic Activity in Syria	10
Figure 11	Investment in Syria	11
Figure 12	Dynamics of Syrian Trade	12
Figure 13	Shipping Density Map	12
Figure 14	Seaborne Trade Volume of Syria	13
Figure 15	Syria’s Balance of Payments	14
Figure 16	Fuel Prices and Fuel Imports in Selected MENA Countries	15
Figure 17	Connectedness between the Syrian and Lebanese Pounds	16
Figure 18	World Bank Estimated Average Exchange Rate in Syria	18
Figure 19	Inflation in Syria	19
Figure 20	Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation	21
Figure 21	Syria’s Fiscal Budget	21
Figure 22	Share of Subsidies in Budget Expenditures in Syria	22
Figure 23	Syria’s Salary Levels	23
Figure 24	Food Insecurity in Syria	24
Figure 25	COVID-19 in Syria	28
Figure 26	Syria Population Pyramid, 2010 and 2021	32
Figure 27	Masculinity Ratio in 2021, by Age Group	32
Figure 28	Trends in under-Five Mortality Rate	33
Figure 29	Number of Absent Members for Households Currently Residing in Syria, by reason of absence	33
Figure 30	Changes in Working Age Population, 2010–2021	34
Figure 31	Relation between Female Labor Force Participation and Masculinity Ratio at the governorate level, 2021	34
Figure 32	Trends in Labor Force Participation and Unemployment Rates, by Gender	35
Figure 33	Actual and Counterfactual GDP	40
Figure 34	Actual and Counterfactual GDP, Adjusted for Regional Shocks	40
Figure 35	Map of Syria with NTLs and Known Flaring Sites	43
Figure 36	Evolution of Flaring, Non-Oil, and Total NTLs	44
Figure 37	Evolution of Non-Oil NTLs by Subnational Regions	45
Figure 38	Per Capita NTLs by Subnational Region	47
Figure 39	Historical NTL Time Series (1992–2021)	47
Figure 40	Historical NTLs and Real GDP (1992–2021)	47
Figure 41	Model Predictions of Real GDP from NTLs	48
Figure 42	Model Predictions of Real GDP by Subnational Region	49
Figure 43	NTL-Based Gini Index	51

Figure 44	The Levels of LBP and SYP	.51
Figure 45	The Returns on LBP and SYP	.52
Figure 46	Autocorrelation and Lead-Lag Relation between the LBP and SYP	.53
Figure 47	Time-Varying Correlation between the Returns on the LBP and SYP	.54
Figure 48	Time-Varying Conditional Correlation between the Returns on the LBP and SYP	.54
Figure 49	Conditional Volatility of LBP and SYP	.55
Figure 50	Quantile-Quantile Plot of the Returns on the LBP and SYP	.55
Figure 51	Total Volatility Spillover Index: LBP and SYP	.57
Figure 52	Directional Volatility Spillovers (FROM)	.58
Figure 53	Returns on the TRY	.58
Figure 54	Volatility of LBP, SYP and TRY	.59
Figure 55	Total Volatility Spillover Index: LBP, SYP and TRY	.60
Figure 56	Directional Volatility Spillovers: LBP, SYP and TRY	.61
Figure 57	Gasoline and Diesel Prices in Lebanon are among the Very Lowest in the Region in the pre-Subsidy Termination Era	.62
Figure 58	Share of Critical Goods Imports in Syria	.64
Figure 59	Weight Structure of the Average Exchange Rate	.64
Figure 60	Average Exchange Rate in Syria	.64
Figure 61	Time Series Dynamics of the Official, Market and Average Exchange Rates	.65
Figure 62	Response to a 1% Shock in the Change in the SYP	.67
Figure 63	Forecast Error Decomposition for Inflation	.67
Figure 64	The Price to Exchange Ratio	.68
Figure 65	Exchange Rates and the CPI	.68
Figure 66	Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation	.70
Figure 67	Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation from the second Specification	.71
Figure 68	Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation from the third Specification	.71

List of Tables

Table 1	Regression Results of Historical NTLs and Real GDP	.8
Table 2	Granger Causality Tests with the Levels and Returns of the LBP and SYP	.17
Table 3	Estimates of the Exchange Rate Pass-through Using the Simple Approach	.20
Table 4	Cumulative Effect of an Exchange Rate Depreciation Based on VAR Models	.20
Table 5	Subsidies by Items	.22
Table 6	Macro Outlook Indicators	.26
Table 7	GDP Level Predictor Means – All Pretreatment Outcome Values Used as Predictors	.39
Table 8	GDP Growth: Panel Data Analysis	.40
Table 9	Regression Results of Historical NTLs and Real GDP	.47
Table 10	Granger Causality Tests with the Levels and Returns of the LBP and SYP	.52
Table 11	Estimates of the Exchange Rate Pass-through Using the Simple Approach	.66
Table 12	Cumulative Effect of an Exchange Rate Depreciation	.67
Table 13	Cumulative Effect of an Exchange Rate Depreciation	.69
Table 14	Pass-through Regressions: Estimation Results	.69

ACRONYMS

ACLED	Armed Conflict Location & Event Data Project	FLFP	Female Labor Force Participation
AER	Average Exchange Rate	FTS	Financial Tracking Service
AIS	Automatic Identification System	G7	Group of Seven
BIC	Bayesian Information Criterion	GARCH	Generalized Autoregressive Conditional Heteroskedasticity
BoP	Balance of Payments	GAUL	United Nations Global Administrative Unit Layer
CBS	Central Bank of Syria	GBV	Gender-based Violence
CGE	Computable General Equilibrium	GDP	Gross Domestic Product
CoVDP	COVID-19 Vaccine Delivery Partnership	GGFRP	Global Gas Flaring Reduction Partnership
COVID-19	Corona Virus Disease 2019	GMM	Generalized Method of Moments
CPI	Consumer Price Index	GNI	Gross National Income
DESA	Department of Economic and Social Affairs	GSCI	Goldman Sachs Commodity Index
DMSP	US Air Force Defense Meteorological Satellite Program	GTAP	Global Trade Analysis Project
DWT	Deadweight Tons	HDI	Human Development Index
EIA	Energy Information Administration	HeRAMS	Health Resources and Services Availability Monitoring System
EMODnet	European Marine Observation and Data Network	HNAP	Humanitarian Needs Assessment Programme
ERPT	Exchange Rate Pass-Through	IDPs	Internally Displaced Persons
ESCWA	Economic and Social Commission for Western Asia	ILO	International Labour Organization
EU	European Union	IMF	International Monetary Fund
EUR	European Monetary Unit	IRFs	Impulse Response Functions
FAO	Food and Agriculture Organization	LBP	Lebanese Pound
FDI	Foreign Direct Investment	MENA	Middle East and North Africa
FEVDs	Forecast Error Variance Decompositions		

PREFACE

The *Syria Economic Monitor* is a new semi-annual economic publication on the Syrian Arab Republic, produced by the Macroeconomics, Trade and Investment (MTI) Global Practice of the World Bank. The aim of this series is: (1) to provide an update on key economic developments, outlook, risks, and policies, and situate them in the conflict context; and (2) to present findings from the World Bank's recent analytical work in Syria (these are found in a Special Focus section). The *Syria Economic Monitor* is part of a more general effort by the MTI Global Practice at the World Bank to better understand economic and social dynamics in fragile, conflict, and violence (FCV) settings, notwithstanding the lack of physical in-country access in some cases. Conflicts are the dominant source of development regression and are projected by the World Bank to account for up to two-thirds of the extreme poor by 2030 (Corral et al., 2020). Hence, in addition to the launch of the *Syria Economic Monitor* series, the MTI MENA Global Practice is also launching two additional FCV Economic Monitor series, the *Libya Economic Monitor* and the *Yemen Economic Monitor*.

Economic monitoring in FCV contexts presents unusual challenges, not least of which is the lack of reliable, timely, and comprehensive data. Syria, for example, ranked last among the 146 surveyed countries on the World Bank's Statistical Capacity Indicator (SCI). To overcome this serious limitation to economic monitoring, we made use of previously unavailable

tools and data, most notably "big data." For example, in this *Syria Economic Monitor* issue, we use innovative geospatial and remote-based data sources (e.g., nighttime lights and nighttime lights-based output estimates, shipping-position data, and population and conflict maps) to help us draw more informed inferences about economic developments in Syria. Through these various data sources, including household surveys conducted by humanitarian organizations on the ground, we are able to quantitatively analyze a range of issues, such as: (1) the decline in the male working age population and its impact on the labor market for Syrian women; (2) Syria's COVID-19 performance in light of its severely degraded health care system following the decade-long war; and (3) exchange rate dynamics and their impact on inflation, where we estimated the exchange rate pass-through effect in Syria, as well as checked the connectedness between the Syrian and Lebanese pound. From this analysis, we gained a better understanding of the depreciation and inflation trends in Syria and their drivers.

The *Syria Economic Monitor* was prepared by a team comprising Luan Zhao (Senior Economist, Task Team Leader), Silvia Redaelli (Senior Economist), Ibrahim Jamali (Senior Consultant), Sherin Varkey (Senior Health Specialist), Ali Ibrahim Almelhem (Economist), Ola Hisou (Consultant), Deyun Ou (Consultant), Priyanka Kanth (Health Specialist), and Katriel Friedman (Consultant). The Special

Focus Chapter, “Demographic and labor market consequences of the Syrian conflict,” was prepared by Silvia Redaelli. Ibrahim Jamali wrote the background notes for “Connectedness between the Syrian and Lebanese Pounds” and “The exchange rate pass-through in Syria.” Ali Ibrahim Almelhem prepared the background note, “Nowcasting economic activity using nighttime lights.” Ola Hisou and Luan Zhao co-wrote the background note, “Average exchange rates for Syria.” Deyun Ou and Luan Zhao prepared the analysis of “Counterfactual GDP calculations for Syria,” based on Harun Onder’s background paper prepared for the World Bank’s “The Fallout of War” report. Sherin Varkey, Katriel Friedman, and Priyanka Kanth prepared the box, “COVID-19 continues to threaten Syria’s health system.” The World Bank’s Find My Friends statistical tool, developed by Faya Hayati (Senior Economist), was applied to benchmark Syria’s investment performance.

The *Syria Economic Monitor* builds on several analytical works conducted by the World Bank since the onset of the conflict in Syria, in particular, a series of one-off studies that aimed at better understanding the economic and social impact of the Syrian conflict. These are *The Toll of War*, issued in 2017, which documented the economic and social impact of the conflict inside Syria, *The Mobility of Displaced Syrians*, issued in 2019, which analyzed the spontaneous returns of Syrian refugees to determine the key factors that influenced their decisions, and *The Fallout of War*, issued in 2020, which examined the human, physical, social, and economic destruction from the conflict in Syria on the country’s neighbors in the Mashreq region. The *Syria Economic Monitor* also benefits from a Data Corps Strategic Brief that advised on data collection and analysis for Syria’s macro monitoring, prepared by Holly Krambeck (Program Manager), Benjamin P. Stewart (Senior Geographer), Oleksandra Postavnicha (IT officer), Rochelle Glenene O’Hagan (Data Scientist), Han Wang (IT officer), Changamire Anderson (Senior IT officer), and Gabriel Stefanini Vicente (Consultant).

The authors are grateful to Saroj Kumar Jha (Country Director), Eric Le Borgne (Practice Manager), Johannes G. Hoogeveen (Practice Manager), Rekha Menon (Practice Manager), Kevin Carey (Adviser), Christos Kostopoulos (Lead Economist), Paul Moreno-Lopez (Acting Lead Economist), Fatima Zehra Shah (Senior Operations Officer), Kamel Braham (Program

Leader), Harun Onder (Senior Economist), Gianluca Mele (Senior Economist), Naoko C. Kojo (Senior Economist), Ha Nguyen (Senior Economist), Nadia Fernanda Piffaretti (Senior Economist), Wissam Harake (Senior Economist), Naila Ahmed (Senior Social Development Specialist), Majid Kazemi (Economist), Mohammad Al Akkaoui (Economist), and Cyril Despouts (Economist), for invaluable discussions and comments during the preparation and review of this report. Wholehearted thanks go to Robert Tchaidze (Senior Economist, International Monetary Fund) for his advice and peer-review support. The team is grateful to Zeina Khalil (Senior External Affairs Officer), who led on report publishing, communications, and outreach, and to Barbara Yuill, for editing the report. Special thanks to Ekaterina Georgieva Stefanova (Senior Program Assistant) and Muna Abed Salim (Senior Program Assistant) for administrative support, and to Abdullah Alruwaishan for the Arabic translation of the Executive Summary. Last but not least, the team is grateful to Robert W. Reinecke, Salem Massalha, and Shehab El-Dien (design, communication, and videography experts) for their impeccable work on the formatting, design and video/infographic contents related to the dissemination of this report.

The findings, interpretations, and conclusions expressed in this Monitor are those of World Bank staff and do not necessarily reflect the views of the Executive Board of The World Bank or the governments they represent.

Although all efforts have been made to improve the accuracy of the information that was collected and analyzed, the assessment was produced in a quick timeframe to ensure the relevance of the estimations. This is a living document and will be updated as new information becomes available.”

For information about the World Bank and its activities in Syria, including e-copies of this publication, please visit <https://www.worldbank.org/en/country/syria/overview#1>. We very much hope this new series will be helpful to a wide range of stakeholders. We welcome comments and suggestions on how to improve future issues (e.g., on data availability, future topics of interest). For questions and comments on the content of this publication, please contact Luan Zhao (lzhao1@worldbank.org), or Eric Le Borgne (eleborgne@worldbank.org). Questions from the media can be addressed to Zeina Khalil (zelkhalil@worldbank.org).



EXECUTIVE SUMMARY

Now moving into its twelfth year, the conflict in Syria has inflicted a devastating impact on the inhabitants and the economy. The conflict accelerated infrastructure depreciation by damaging strategic assets (the destruction channel) and deepened demographic aging by displacing many people (the displacement channel). In addition, the conflict eroded social cohesion, degraded governance, and led the division of the previously integrated areas in Syria (the disorganization channel). Together, these channels have halved the size of economic activity between 2010 and 2019. The report estimates that in the absence of the conflict (the counterfactual), Syria's Gross Domestic Product (GDP) in 2019 would have been US\$ 38.6 billion in 2015 constant prices, compared to US\$ 16.3 billion of the realized GDP. Furthermore, the massive refugee flows triggered by the Syrian conflict, combined with other spillovers, including through trade and financial channels, have imposed a heavy economic and social toll on Syria's neighbors in the Mashreq region and beyond.

Conflict, displacement, and the collapse of economic activities have all contributed to the decline in household welfare. Extreme poverty has consistently risen since the onset of the conflict, reflecting deteriorating livelihood opportunities and the progressive depletion of household coping capacity. In non-monetary terms, access to shelter, health, education, water, and sanitation have all worsened

dramatically since the conflict began. With a severely degraded health care system following the decade-long war, Corona Virus Disease 2019 (COVID-19) has only exacerbated the vulnerable situations. The number of new cases has started to decrease since March 2022. Yet, the high cumulative case fatality rate indicates the inability of the health system to cope with the needs of COVID-19 patients. COVID-19-associated deaths are relatively high in Syria, partially due to a slow vaccine rollout. As of May 14, 2022, only 9.1 percent of Syrians were fully vaccinated, and another 5.2 percent were partially vaccinated.

Beyond the immediate impact of the conflict, the economy suffers from the compounding effects of the pandemic, adverse weather events, regional fragility, and macroeconomic instability. Since 2020, Syria's external economic ties have been severely restrained by the deepening crisis in neighboring Lebanon and Turkey, as well as the introduction of new United States (US) sanctions under the Caesar Act. The market exchange rate of the Syrian pound against the US dollar weakened by 26 percent year-on-year (yoy) in 2021, following a 224 percent yoy depreciation in 2020. Given Syria's heavy reliance on imports, currency falls quickly feed into higher domestic prices, causing high inflation. The report estimates that annual inflation reached 90 percent yoy in 2021, after hitting 114 percent yoy in 2020. The war in Ukraine shocked commodity

markets, pushing food and fuel prices in Syria even higher. As a net importer of food and fuel, soaring prices have been adversely affecting Syria's external balances, inflation, and international reserves.

Syria's high inflation has affected the poor and vulnerable disproportionately. Food prices—proxied by the World Food Programme (WFP) minimum food basket price index—rose by 97 percent during 2021, on top of a 236 percent increase in 2020. Driven by the noticeable increase in commodity prices, government subsidies on essential food and fuel products have dramatically risen over the past years, accounting for over half of the total budgeted expenditures for 2021 and 2022. To save its budget, Syria's government has tightened rationing, which has inevitably deteriorated the already dire living conditions of the Syrian people. WFP data show that more than half of households surveyed (52 percent) reported inadequate food consumption in February 2022, double the early 2019 share. Syria's food insecurity has worsened further after the war in Ukraine.

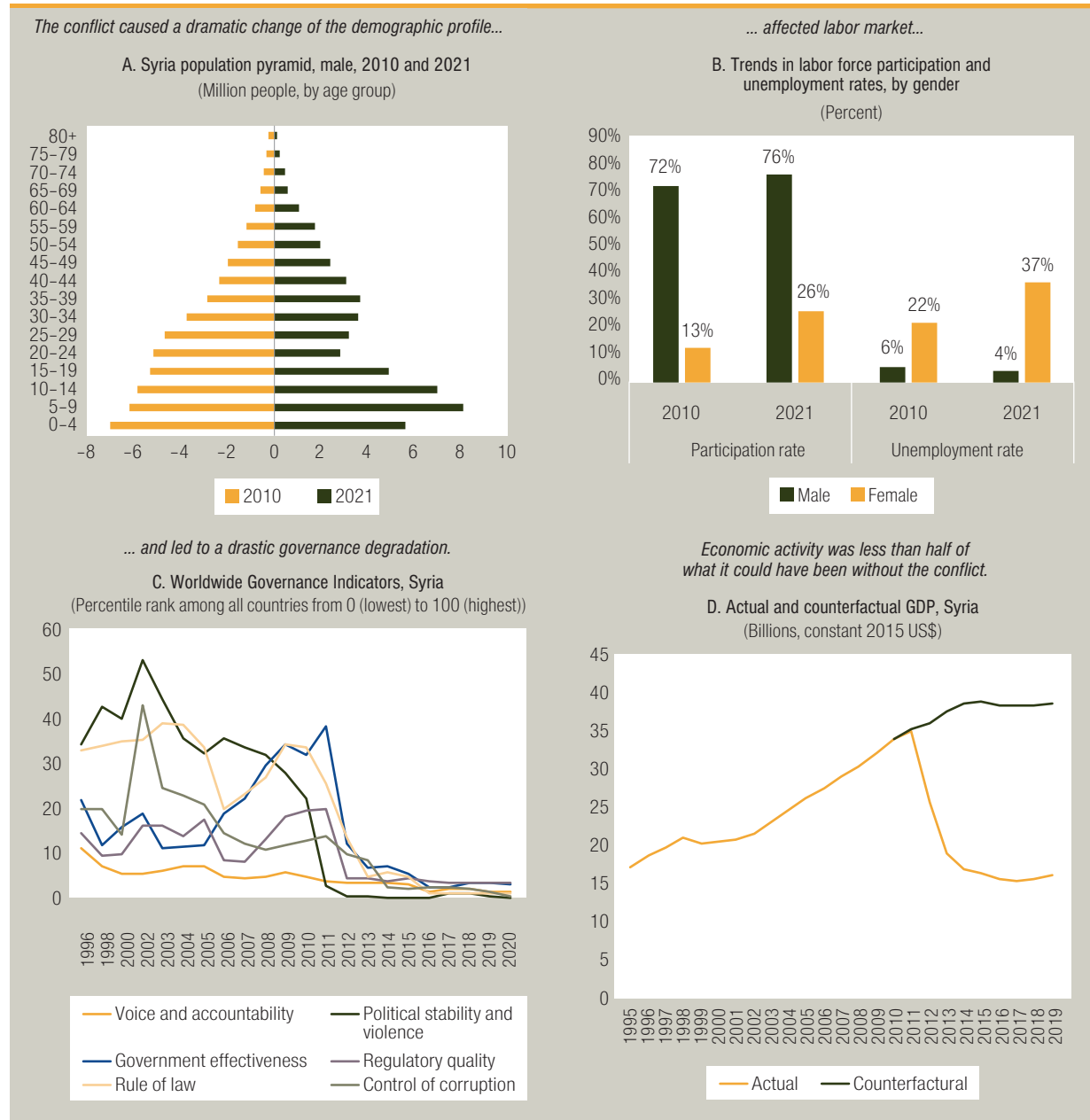
Economic conditions in Syria are projected to continue to be mired by prolonged armed conflict, turmoil in Lebanon and Turkey, COVID-19, and the war in Ukraine. Subject to extraordinarily high uncertainty, we project that Syria's real GDP will contract by 2.6 percent in 2022 (to US\$ 15.5 billion in constant 2015 prices) after declining by 2.1 percent in 2021. Private consumption will remain subdued with continued erosion of purchasing power amid rising prices and currency depreciation. Private investment is projected to remain weak as the security situation is assumed to remain volatile and economic and policy uncertainties persist. Government spending, especially capital expenditures, will continue to be constrained by low revenues and the lack of access to financing. The current account of Syria will remain firmly in deficit because of an extremely high trade deficit that will only be partially offset by net current transfer inflows. A persistent twin deficit will further drain foreign exchange reserves, putting further pressure on the domestic currency. Inflation is projected to remain elevated in the short term, due to the pass-through effects of currency depreciation, persistent food and fuel shortages, and reduced food and fuel rationing, which will stress the already struggling poor.

Risks to the growth outlook are significant and tilted to the downside. Two major sources of uncertainty are the COVID-19 pandemic and the war in Ukraine. In the event of a rapid spread of more transmissible and deadly COVID-19 variants in Syria, slow vaccination rollouts and inadequate health facilities will exacerbate its impact. Owing to its heavy reliance on food and fuel imports, Syria is particularly vulnerable to the disruptions in the commodity market and trade-policy interventions triggered by the war in Ukraine. Despite the growing need, there is a risk that donors may shift some aid away from Syria and the Syrian war-affected refugees amid the global decrease in humanitarian funding, which will exacerbate the already acute food insecurity of the country. Economic stagnation and the deterioration of public services may lead to increased social unrest. On the upside, Syria's improved trade relations with its Arab neighbors could reduce its economic isolation. Recently, foreign investment restrictions in northwest Syria were eased, and non-governmental organizations (NGOs) were allowed to do more business in Syria. These measures may potentially facilitate trade, investment, and humanitarian operations in Syria.

Special Focus: Demographic and labor market consequences of the Syrian conflict

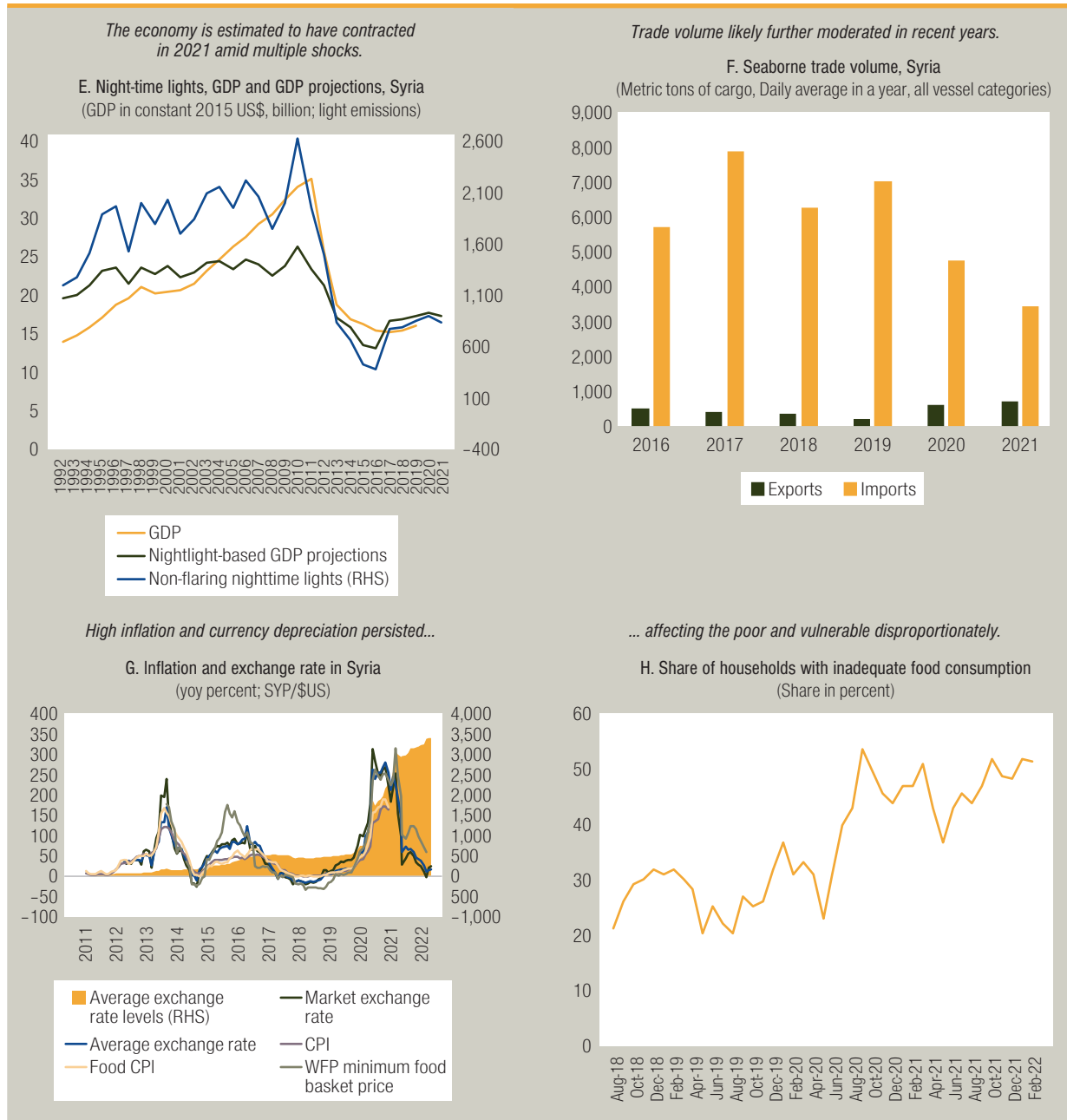
The current demographic profile of the Syrian population provides a good illustration of the massive human impact of the conflict. After about a decade of war, the demographic profile of the Syrian population has dramatically changed, with the male deficit in prime-age adult population being its most prominent feature. The decline in the male working age population, together with the progressive deterioration of economic conditions in the country, have pushed more Syrian women to enter the labor market to help support their families. However, Syrian women continue to face severe challenges in terms of unemployment and lack economic opportunities compared to their male counterparts. These challenges have been further exacerbated as a result of conflict.

FIGURE 1 • Syria: Economic Development at a Glance



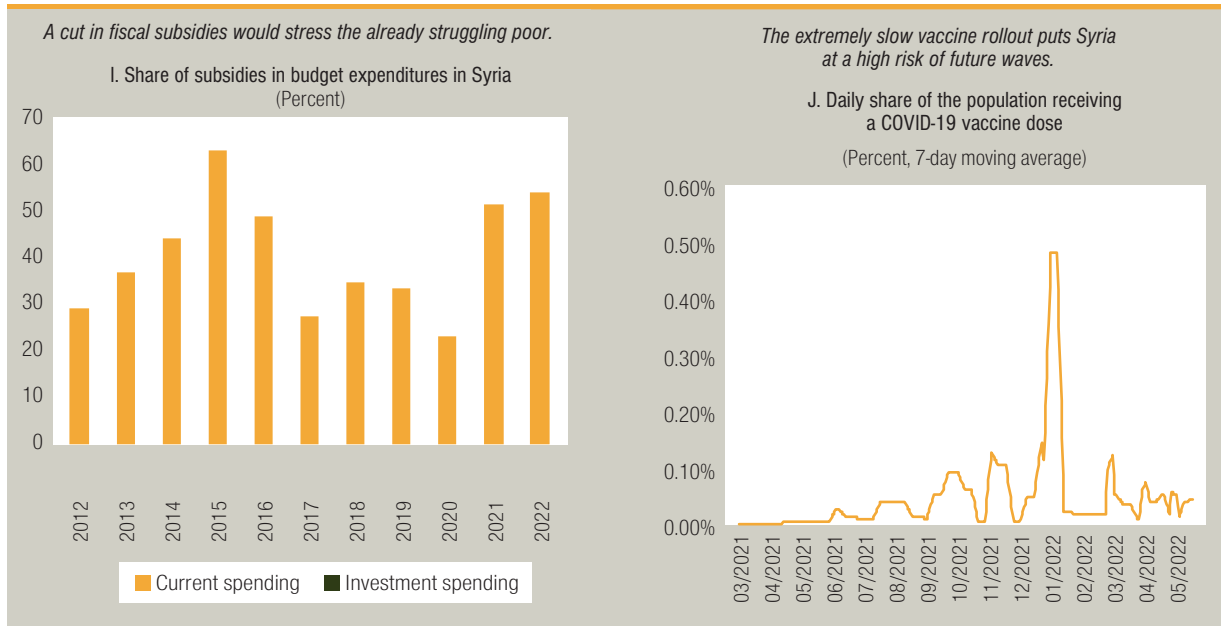
(continued on next page)

FIGURE 1 • Syria: Economic Development at a Glance *(continued)*



(continued on next page)

FIGURE 1 • Syria: Economic Development at a Glance (continued)



Source: United Nations (UN) World Population Prospects 2010; Humanitarian Needs Assessment Programme (HNAP) household survey data (Summer 2021); Syria Labor Force Survey 2010; Worldwide Governance Indicators report (various years); World Development Indicators (WDI); Penn World Table 10.0; Center for Systemic Peace; The Visible Infrared Imaging Radiometer Suite (VIIRS) and Defense Meteorological Satellite Program (DMSP) satellites; Cerdeiro, Komaromi, Liu and Saeed (2020); UN Comtrade Monitor; Central Bureau of Statistics, Syria; WFP Market Price Watch Bulletin; Syria mVAM Bulletin; Ministry of Finance (MOF) of Syria; Our World in Data; World Bank staff estimates and projections.

Notes: A. World Bank calculations were based on UN World Population Prospects 2010 and HNAP household survey data (Summer 2021). B. World Bank calculations were based on Labor Force Survey 2010 and HNAP household survey data (Summer 2021). D. The counterfactual analysis is performed using a tool called synthetic control method (SCM). The SCM consists of searching for a weighted combination of countries that resemble as closely as possible the economic characteristics of Syria in the pre-conflict period to create a synthetic economy (the control), to see how this economy performed over Syria's conflict period. The counterfactual results also account for the regional negative impact that growth in the Middle East and North Africa (MENA) region was lower than the global average in the post-conflict period. E. Nighttime Lights (NTLs) are regressed against real GDP in logarithmic form. The coefficient is applied to convert NTL observations into GDP estimates for 2020 and 2021. F. Automatic Identification System (AIS) shipping-position data collected by MarineTraffic. It first assesses import and export vessel capacity measured in deadweight tons (DWT) by country and ship type, and then uses machine-learning algorithms to estimate metric tons of cargo carried. H. The survey is collected by World Food Programme (WFP) via live telephone interviews from households in locations across Syria. The data reflects the share of the interviewed households reporting poor or borderline food consumption. I. The fiscal data pertains to the Central Government in Damascus and excludes all taxes, transfers, and expenses incurred by the autonomous region in northeastern Syria. Estimates include the off-budget electricity subsidies. J. All doses, including boosters, are counted individually.

الملخص التنفيذي

الحاصلين على لقاح كورونا بشكل كامل 9.1 في المئة فقط من اجمالي عدد السكان، في حين بلغ عدد الحاصلين على لقاح كورونا بشكل جزئي 5.2 في المئة.

إلى جانب التأثير المباشر للصراع، يعاني الاقتصاد من الآثار المضاعفة للجائحة، والأحداث المناخية القاسية، وهشاشة المنطقة ككل، وعدم استقرار الاقتصاد الكلي. أصبحت العلاقات الاقتصادية الخارجية لسوريا منذ العام 2020 تحت قيود شديدة بسبب الأزمات المتفاقمة في البلدين المجاورين لسوريا، لبنان وتركيا، فضلاً عن فرض عقوبات أمريكية جديدة بموجب قانون قيصر. انخفض سعر صرف السوق لليرة السورية مقابل الدولار الأمريكي بنسبة 26 في المئة في عام 2021، وذلك بعد انخفاض سنوي بنسبة 224 في المئة عام 2020. وبالنظر إلى اعتماد سوريا الكبير على الواردات، سرعان ما أدى انخفاض العملة إلى ارتفاع الأسعار محلياً، مما تسبب في ارتفاع معدل التضخم. يقدر التقرير أن التضخم السنوي بلغ 90 في المئة في عام 2021، وكان قد بلغ 114 في المئة عام 2020. تسببت الحرب في أوكرانيا في صدمة لأسواق السلع الأساسية، مما دفع أسعار الغذاء والوقود في سوريا إلى الارتفاع أكثر وأكثر. ولكون سوريا مستورداً صافياً للغذاء والوقود، فقد أثر ارتفاع الأسعار هذا سلباً على موازين التجارة الخارجية لسوريا والتضخم والاحتياجات الدولية.

أثر التضخم المرتفع في سوريا على الفقراء والضعفاء بشكل غير متناسب. ارتفع معدل تضخم أسعار الغذاء وفقاً لمؤشر الحد الأدنى لسعر سلة الغذاء التابع لبرنامج الغذاء العالمي بنسبة 97 في المئة خلال عام 2021، بالإضافة إلى زيادة بنسبة 236 في المئة في عام 2020. نتيجة للزيادة الملحوظة في أسعار السلع الأساسية، ارتفع الدعم الحكومي للسلع الغذائية الأساسية والوقود بشكل كبير خلال السنوات الماضية، حيث يمثل هذا الدعم أكثر من نصف إجمالي بند النفقات في موازنة عامي 2021 و2022. وللتوفير في الموازنة، ضيقت الحكومة السورية نظام الحصص التموينية، الأمر الذي أدى بكل تأكيد إلى تدهور الظروف المعيشية للشعب السوري والتي كانت متردية في الأساس. تظهر بيانات برنامج الغذاء العالمي أن أكثر من نصف الأسر التي شملها استطلاع المنظمة (52

دخل الصراع في سوريا عامه الثاني عشر جالباً معه ما جلب من آثار مدمرة على السكان والاقتصاد. أدى هذا الصراع إلى تسارع تدهور البنية التحتية، كونه تسبب في الأضرار بالممتلكات والأصول الاستراتيجية (مسار الدمار)، وتعميق شيخوخة السكان نتيجة لنزوح عدد كبير من الناس (مسار النزوح). كما تسبب في الأضرار باللحمة المجتمعية، وتردي الحوكمة، وأدى إلى انقسام منطقة كانت تتصف بالوحدة والاندماج ذات يوم في سوريا (مسار الفوضى). ساهمت هذه المسارات مجتمعة في خفض حجم النشاط الاقتصادي إلى النصف خلال الفترة الممتدة بين عامي 2010 و2019. يقدر هذا التقرير - أنه في حال افتراض عدم وجود الصراع (أي بافتراض وضع أو واقع مغاير للواقع الحالي)، لكان الناتج المحلي الإجمالي لسوريا لعام 2019 ليلعب 38.6 مليار دولار أمريكي باستخدام الأسعار الثابتة لعام 2015، وذلك مقابل 16.3 مليار دولار أمريكي وهي قيمة الناتج المحلي الإجمالي المحقق. بالإضافة إلى ذلك، تسببت التدفقات الهائلة للاجئين الناجمة عن الصراع السوري، إلى جانب التداعيات الأخرى التي تتضمن المسارات التجارية والمالية، في تكبد البلدان المجاورة لسوريا في منطقة المشرق خسائر اقتصادية واجتماعية فادحة.

ساهمت عوامل الصراع، والنزوح، وانهيار الأنشطة الاقتصادية في تدهور المستوى المعيشي للأسرة. ارتفعت معدلات الفقر المدقع ارتفاعاً مطرداً منذ بداية الصراع، وهذا ما يعكس تدهوراً في فرص كسب العيش والتآكل التدريجي لقدرة الأسرة على التكيف. أما من الناحية غير النقدية، فقد ساءت فرص الحصول على المأوى، وسبل العيش، والصحة، والتعليم، والمياه، والصرف الصحي بشكل كبير منذ بدء النزاع. في ظل التدهور الكبير لنظام الرعاية الصحية في أعقاب الحرب التي استمرت عقداً من الزمان، أدت جائحة كورونا عام 2019 إلى تفاقم الضعف والهشاشة. منذ شهر مارس / آذار 2022 بدأ عدد حالات الإصابات الجديدة بكورونا في الانخفاض، ولكن معدل الوفيات التراكمي المرتفع يدل على عدم قدرة النظام الصحي على تلبية احتياجات المصابين بكورونا. كان عدد الوفيات المرتبطة بكورونا مرتفعاً نسبياً في سوريا، ويُعزى ذلك جزئياً إلى البطء في تقديم اللقاحات، حتى تاريخ 14 مايو / أيار 2022، بلغ عدد السوريين

في المئة) أبلغت عن عدم كفاية الغذاء في فبراير / شباط 2022، أي ضعف النسبة أوائل عام 2019. هذا وقد ازداد تفاقم انعدام الأمن الغذائي في سوريا بعد الحرب في أوكرانيا.

من المتوقع أن تستمر الظروف الاقتصادية بالتهديد في سوريا، المتضررة بالصراع طويل الأمد، والاضطرابات في لبنان وتركيا، وجائحة كورونا، والحرب في أوكرانيا. في ظل حالة عدم اليقين المرتفعة بشكل استثنائي، نتوقع أن ينكمش الناتج المحلي الإجمالي الحقيقي لسوريا بنسبة 2.6 في المئة في عام 2022 (إلى 15.5 مليار دولار بالأسعار الثابتة لعام 2015)، وذلك بعد انخفاضه بنسبة 2.1 في المئة في عام 2021. ستظل معدلات الاستهلاك الخاص ضعيفة مع استمرار تآكل القوة الشرائية في ظل ارتفاع الأسعار وانخفاض قيمة العملة. يُتوقع أن يظل الاستثمار الخاص ضعيفاً مع افتراض استمرار تقلب الوضع الأمني وتواصل حالة عدم اليقين الاقتصادي والسياسي. سيظل الإنفاق الحكومي، وخاصة النفقات الرأسمالية، مقيداً بانخفاض الإيرادات ونقص الوصول إلى التمويل. سيظل الحساب الجاري لسوريا في حالة عجز ثابت نتيجة العجز التجاري المرتفع للغاية والذي لن يُعوض عدا جزئياً من خلال صافي تدفقات التحويلات الجارية. سيؤدي العجز المزدوج المستمر إلى زيادة في استنزاف احتياطيات النقد الأجنبي، مما سيزيد من الضغط على العملة المحلية. من المتوقع أن يظل معدل التضخم مرتفعاً على المدى القصير، وذلك بسبب الآثار العابرة لانخفاض قيمة العملة، واستمرار نقص الغذاء والوقود، و تقنين الغذاء والوقود، مما سيضغط على الفقراء الذين يعانون في الأساس.

المخاطر على توقعات النمو كبيرة ومُهِمِل للتوجه سلباً. هناك مصدران رئيسيان لعدم اليقين وهما جائحة كورونا والحرب في أوكرانيا. في حالة حدوث انتشار سريع لمُتحوّر سريع الانتقال وفتاك في سوريا، فإن عمليات التطعيم البطيئة وعدم كفاية المرافق الصحية ستؤدي إلى تفاقم تأثيره. نظراً لاعتماد سوريا الشديد على واردات الغذاء والوقود، فإن سوريا معرضة بشكل خاص لآثار الاضطرابات في سوق السلع الأساسية وتدخلات السياسة التجارية التي تسببت فيها الحرب في أوكرانيا. على الرغم من الاحتياجات المتنامية، إلا أن هناك مخاطر قيام الجهات المانحة بتحويل بعض المساعدات بعيداً عن سوريا واللجوءين السوريين المتضررين من الحرب، وذلك في ظل الانخفاض العالمي للتمويل الإنساني، مما سيؤدي إلى تفاقم انعدام الأمن الغذائي الحاد بالفعل في البلاد. قد يؤدي الركود الاقتصادي وتدهور الخدمات العامة إلى زيادة الاضطرابات الاجتماعية، مفضياً إلى حالة من عدم الاستقرار السياسي. أما من الناحية الإيجابية فيمكن أن يؤدي تحسن العلاقات التجارية السورية مع جيرانها العرب إلى تقليل عزلتها الاقتصادية. في الآونة الأخيرة، تم تخفيف قيود الاستثمار الأجنبي في شمال شرق وشمال غرب سوريا، وسمح للمنظمات غير الحكومية بممارسة المزيد من الأعمال التجارية في سوريا، وبالتالي قد تسهل هذه الإجراءات من التجارة والاستثمار والعمليات الإنسانية.

تركيز خاص: تداعيات الصراع السوري على السكان وسوق العمل

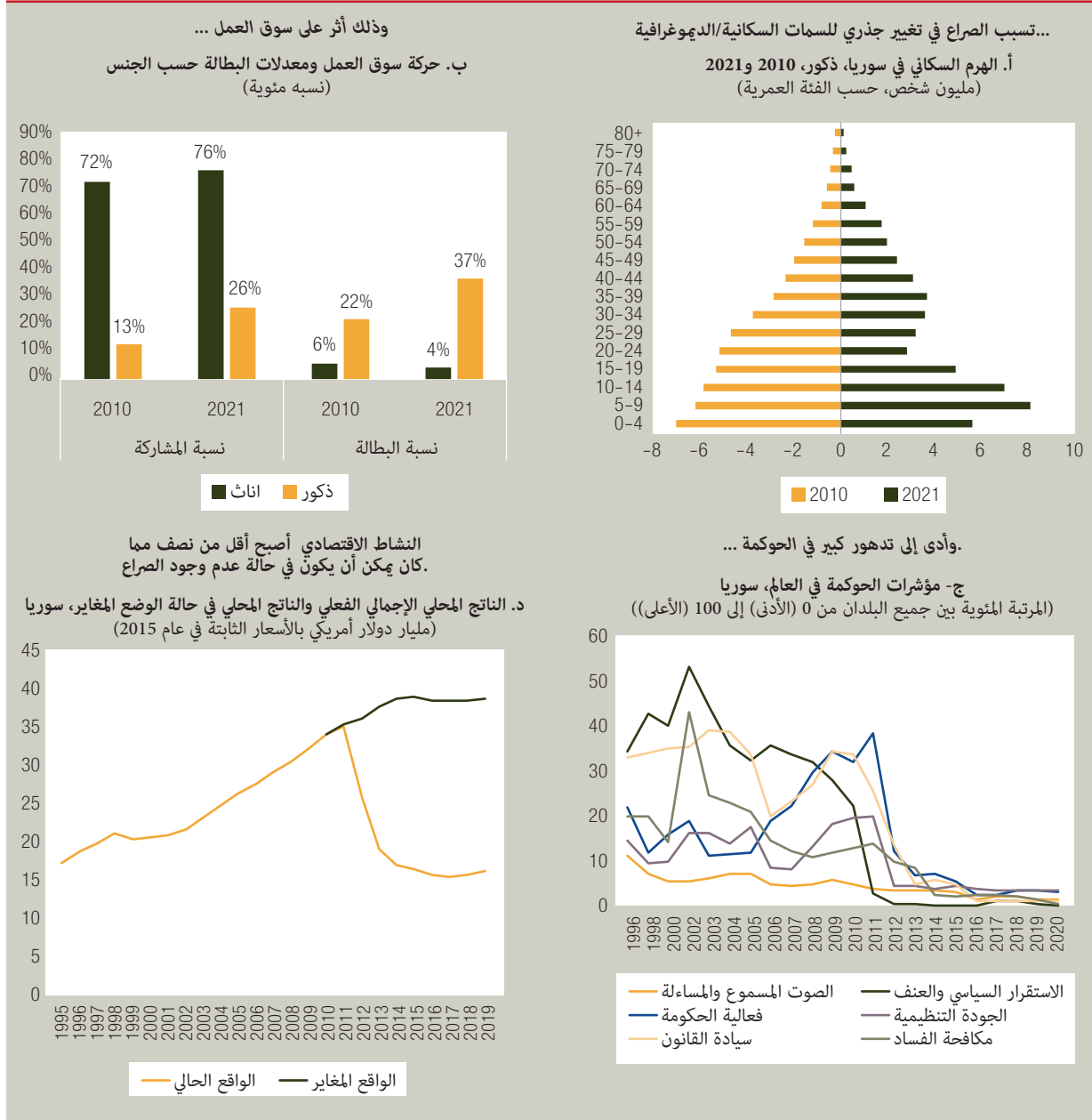
تقدم السمات الديموغرافية الحالية لسكان سوريا مثلاً جيداً على التأثير البشري الهائل (بالصراع) فبعد نحو عقد من الحرب، تغيرت السمات

الديموغرافية لسكان سوريا بشكل كبير، وكانت أبرز تلك السمات انخفاض عدد الذكور بين السكان البالغين سن الرشد. دفع الانخفاض في عدد الذكور في سن العمل، بالإضافة إلى التدهور التدريجي للظروف الاقتصادية في البلاد، بالمزيد من النساء السوريات إلى دخول سوق العمل للمساعدة في إعالة أسرهن. ومع ذلك، لا تزال المرأة السورية تواجه تحديات كبيرة من حيث البطالة وانعدام الفرص الاقتصادية مقارنة بنظيرها الرجل، وهي تحديات زاد الصراع من تفاقمها.

المصدر: التوقعات السكانية العالمية للأمم المتحدة 2010؛ بيانات مسح الأسر لبرنامج تقييم الاحتياجات الإنسانية (HNAP) (صيف 2021)؛ مسح القوى العاملة في سوريا 2010؛ تقرير مؤشرات الحكومة العالمية (سنوات متعددة)؛ مؤشرات التنمية العالمية (WDI)؛ جدول بن وورلد 10.0؛ مركز السلام المنهجي؛ مجموعة مقياس إشعاع التصوير المرئي بالأشعة تحت الحمراء (VIIRS) وبرنامج الأقمار الصناعية الدفاعية للأرصاء الجوية (DMS)؛ سيرديرو، وكومارومي، وليو، وسعيد (2020)؛ برنامج التجارة COMTRADE للأمم المتحدة؛ المكتب المركزي للإحصاء، سوريا؛ نشرة برنامج الغذاء العالمي لمراقبة أسعار السوق؛ نشرة تحليل وخارطة الفئات الهشة عبر الهاتف المحمول (mVAM)؛ وزارة المالية السورية؛ عالمنا في بيانات؛ تقديرات وتوقعات خبراء البنك الدولي.

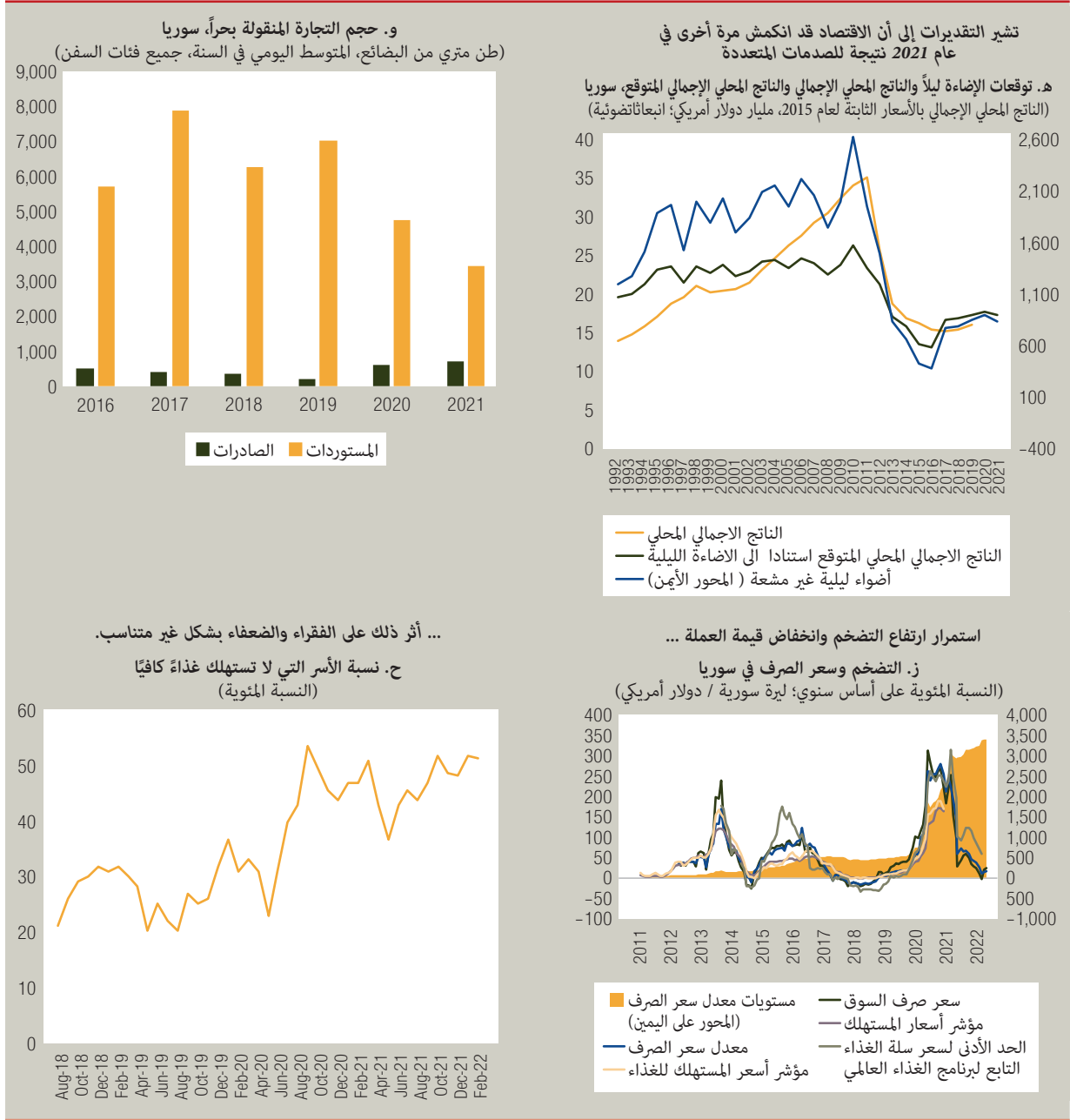
ملاحظات: أ. حسابات البنك الدولي بُنيت على بيانات الأمم المتحدة للتوقعات السكانية في العالم لعام 2010 وبيانات مسح الأسر لبرنامج تقييم الاحتياجات الإنسانية (HNAP) (صيف 2021)؛ ب. حسابات البنك الدولي بُنيت على مسح القوى العاملة لعام 2010 وبيانات مسح الأسر لبرنامج تقييم الاحتياجات الإنسانية (HNAP) (صيف 2021)؛ ج. يتم إجراء تحليل للوضع المغاير (افتراض وضع مغاير للوضع الحالي) باستخدام أداة تسمى طريقة التحكم التركيبي (SCM)، وهي أسلوب احصائي يتمثل في البحث عن مجموعة مرجحة من البلدان التي تشبه خصائصها الاقتصادية إلى حد كبير الخصائص الاقتصادية في سوريا في فترة ما قبل الصراع وذلك لإنشاء اقتصاد تركيبي منها لمعرفة كيفية أداء هذا الاقتصاد خلال فترة الصراع في سوريا. تفسر نتائج الواقع المغاير التأثير السلبي الإقليمي المتمثل في أن النمو في منطقة الشرق الأوسط وشمال إفريقيا كان أقل من المتوسط العالمي في فترة ما بعد الصراع. ه. تراجع الإضاءة الليلية مقابل الناتج المحلي الإجمالي الحقيقي في مستويات أو على شكل لوغاريتمات. يتم تطبيق المعامل لتحويل ملاحظات الإضاءة الليلية إلى تقديرات إجمالي الناتج المحلي لعامي 2020 و2021. و. تستخدم المنصة بيانات مواقع سفن الشحن التي تجمع بواسطة مشروع MarineTraffic. تقوم المنصة أولاً بتقييم سعة سفن الاستيراد والتصدير المقاسة بالأطنان الساكنة (الحمولة الساكنة) حسب بلد ونوع السفينة، ومن ثم تستخدم خوارزميات التعلم الآلي لتقدير حجم البضائع المنقولة بالطن المترى. ز. تم جمع المسح من قبل برنامج الغذاء العالمي من خلال مقابلات هاتفية مباشرة مع الأسر في مواقع تشمل جميع أنحاء سوريا. تعكس البيانات نسبة الأسر التي أبلغت عن ضعف أو محدودية استهلاك الغذاء من الأسر التي تمت مقابلتها. ح. البيانات المالية تخص الحكومة المركزية في دمشق وتستثني جميع الضرائب والتحويلات والمصرفيات لمنطقة الحكم الذاتي في شمال شرق سوريا. تشمل التقديرات دعم الكهرباء خارج الموازنة ط. تحسب جميع الجرعات، بما في ذلك الجرعات المعززة، بشكل منفرد.

الشكل رقم 1 • سوريا: لمحة عن التنمية الاقتصادية



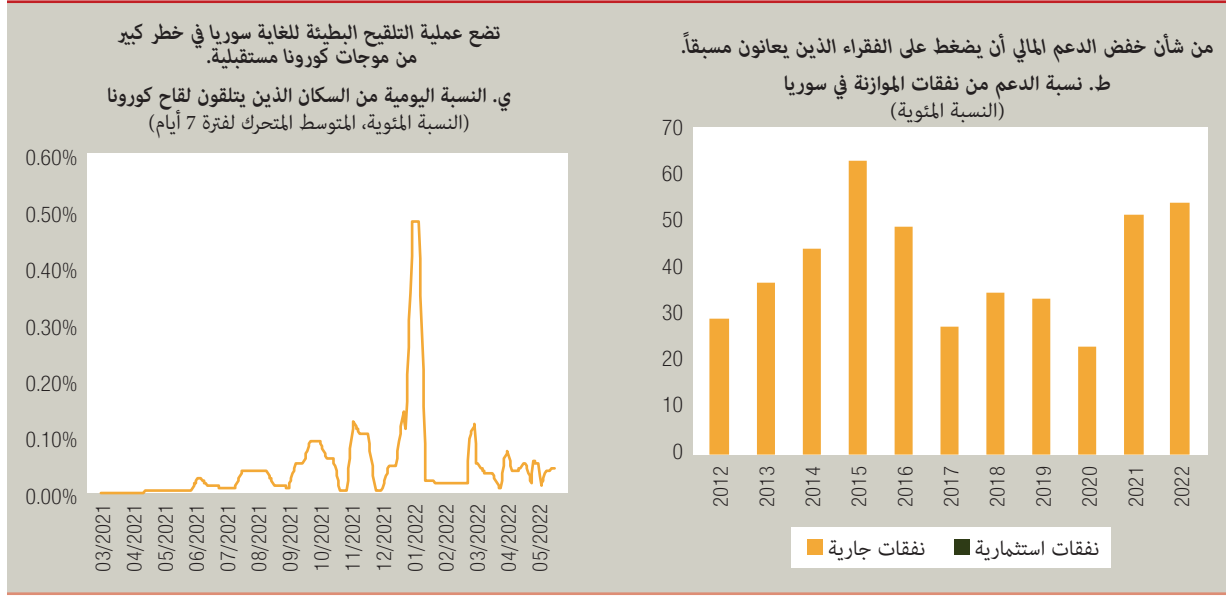
(يتبع في الصفحة التالية)

الشكل رقم 1 • سوريا: لمحة عن التنمية الاقتصادية (يتبع)



(يتبع في الصفحة التالية)

الشكل رقم 1 • سوريا: لمحة عن التنمية الاقتصادية (يتبع)



المعهد الوطني للإحصاء.

THE CONFLICT CONTEXT

Although the intensity of the conflict has declined from its peak in the mid-2010s, Syria remains a top-ranked country worldwide in terms of violent deaths. According to statistics compiled by the Armed Conflict Location & Event Data Project (ACLED), Syria ranked among the top ten countries in the world with 7,465 conflict-related deaths in 2021. In 2021, active conflicts were largely concentrated in the northern regions, with armed clashes and military operations frequently occurring in the governorates of Idleb, Aleppo, and Deir-es Zor (Figure 2).

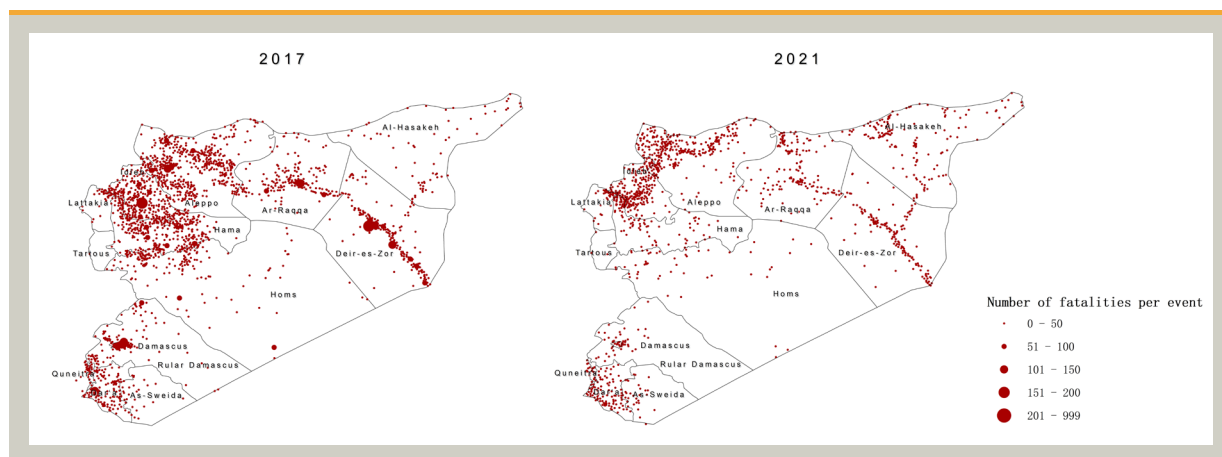
The conflict has inflicted extensive damage to Syria's physical infrastructure. During the initial stage of conflict, cities like Homs, Aleppo, and Damascus, and many smaller towns, have served as battlegrounds for government and rebel offensives. Over time, the conflict has caused the partial or full breakdown of urban systems in many cities by destroying houses and public service-related infrastructure like roads, schools, and hospitals. Many strategic assets, particularly in the energy, water and sanitation, and transportation sectors, have been destroyed. According to a damage assessment

conducted by the World Bank covering 15 Syrian cities in June 2018, about one-fifth of all residential buildings suffered damage, about a quarter of which were fully destroyed. Meanwhile, about 40 percent of educational facilities were damaged, destroyed, or occupied by parties to the conflict or serve as shelters to Internally Displaced Persons (IDPs).¹ According to the World Health Organization (WHO) Whole of Syria consolidated Health Resources and Services Availability Monitoring System (HeRAMS) for Q4 2021, just 59 percent of hospitals and 54 percent of primary healthcare centers (PHCs) were estimated to be fully functional across Syria. A forthcoming damage assessment conducted by the World Bank in collaboration with the European Union (EU) revealed that Syria continued to suffer significant physical damage in selected sectors and cities in late 2021.

The conflict has substantially impacted human lives and caused dramatic changes in Syria's demography. In the absence of recent official census data, knowledge of the population dynamics since the onset of the conflict comes from

¹ World Bank, "The Mobility of Displaced Syrians," (2019).

FIGURE 2 • Conflict-Related Casualties in Syria by Event Year, 2017 and 2021

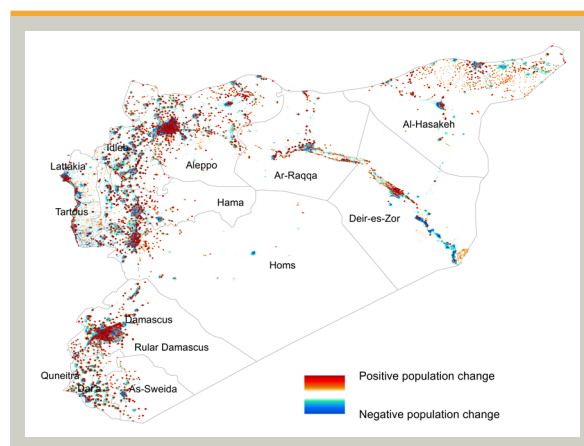


Source: ACLED; World Bank staff estimates.
 Note: Deaths that resulted from both political violence and civilian targeting events are counted.

estimates performed by different agencies. However, all estimates suggest that during the conflict, massive and rapid movements of Syrians took place, both internally and in the direction of other countries. The exodus of Syrians from some places and their influx into others have changed the distribution of Syria's population dramatically (Figure 3). The demographic structure of the Syrian population has also been severely affected by conflict, with the male deficit in prime-age adult population being its most prominent feature. (Special Focus Chapter). According to the latest estimates by the Humanitarian Needs Assessment Programme (HNAP), the total population within Syria, including residents, returnees, and IDPs registered at 21.1 million as of February 2022, slightly short of the 2010 (pre-conflict) population of 21.4 million but about one-third short of the 30.7 million that was projected for 2022 in the absence of the conflict, given the country's high fertility rate (about 3.5 births per woman).²

More than half of Syria's pre-conflict population remains displaced, including 6.8 million IDPs in Syria and 6.9 million Syrian refugees displaced abroad (Figure 4 and Figure 5). The scale and extent of the ensuing forced displacement triggered by the Syrian conflict represents one of the largest displacements since World War II. In 2021, conflict and violence triggered 456,000 internal displacements in Syria, the lowest since 2012. Yet, new internal displacements in Syria in 2021 ranked among the ten highest in the

FIGURE 3 • Change in Population Density, Syria, 2010-2020 (100-meter resolution)



Source: WorldPop; World Bank staff estimates.

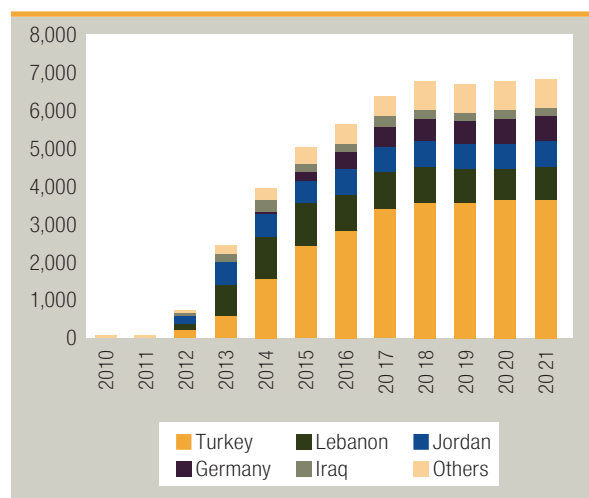
world, according to the Global Internal Displacement Database. Furthermore, disasters, most resulting from floods, gales, and snowstorms, triggered 79,000 displacements in Syria in 2021.³

The conflict has also triggered intangible effects that proved detrimental to the economy. In addition to damaging strategic assets (the destruction channel) and triggering forced outmigration and

² Assuming Syria's population would have continued to grow at its 2005–2010 average rate (i.e., at 3.07 percent).

³ "Syrian Arab Republic" country profile, Internal Displacement Monitoring Centre.

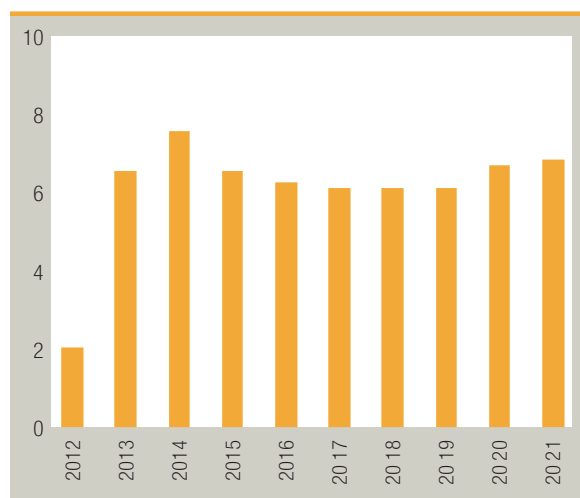
FIGURE 4 • Syrian Refugees by Hosting Countries (Million)



Source: United Nations High Commissioner for Refugees (UNHCR)'s Refugee Population Statistics Database.

Note: Both registered refugees and asylum-seekers included. Asylum-seekers refers to individuals who have sought international protection but whose claims for refugee status have not yet been determined.

FIGURE 5 • Internally Displaced Persons (IDPs) (Million)



Source: United Nations High Commissioner for Refugees (UNHCR)'s Refugee Population Statistics Database.

Note: Both registered refugees and asylum-seekers included. Asylum-seekers refers to individuals who have sought international protection but whose claims for refugee status have not yet been determined.

domestic displacement (the displacement channel), the Syrian conflict has also disrupted social and economic networks (the disorganization channel).⁴ These disruptions did not necessarily reduce the stock of productive assets directly, but they reduced the rates at which the economy effectively utilizes those assets. Since the conflict, the division of the previously integrated areas in Syria has cut off connectivity, public service delivery systems, and supply chains. Furthermore, intensified rent-seeking eroded social cohesion, and governance degradation brought additional obstacles to economic activity. The Syria Center for Policy Research (SCPR) documented a significant decrease in Syrian social capital, defined over three broad categories: social networks and community participation, trust, and shared values and attitudes.⁵ While Syria ranked below the Middle East and North Africa (MENA) average on several governance indicators before the conflict, they remained low and, in many instances, further deteriorated during the conflict (Figure 6). Consistent with this trend, Syria ranked 178th out of 180 countries (worst 1 percent) in corruption perception index in 2021, down from 127th out of 178 countries (worst 30 percent) in 2010.

The destruction of physical capital, casualties, forced displacement, and the breakup of

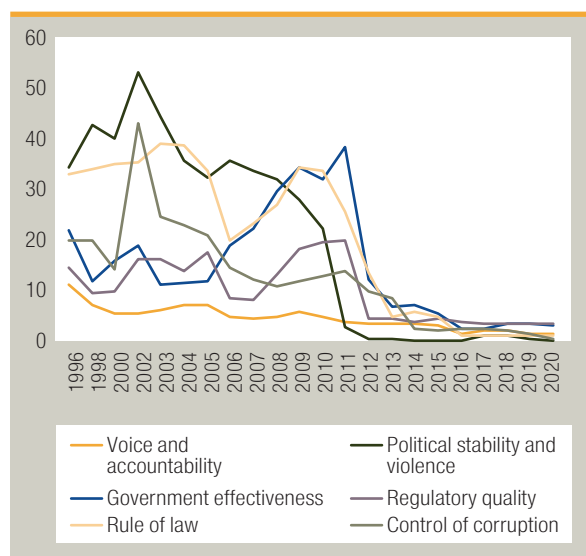
economic networks has halved the size of the economy compared to 2010. According to Syria's Central Bureau of Statistics, GDP contracted by 52 percent between 2010 and 2019 in real terms (Figure 7). A more appropriate estimate of the cost of the conflict as far as GDP is concerned is to compare economic activity in 2019 with what it would have been in the absence of the conflict. Such an analysis is possible using a tool called a synthetic control method (SCM).⁶

⁴ See "The Toll of War" (World Bank, 2017) for a description of the "3D" channels.

⁵ SCPR. "Social Degradation in Syria: The Impact of Conflict on Social Capital," Syrian Center for Policy Research, Beirut, (2017).

⁶ The SCM consists of searching for a weighted combination of countries that resemble as closely as possible the economic characteristics of Syria in the pre-conflict period to create a synthetic economy (the control) to see how this economy performed over Syria's conflict period and compare it with Syria's actual growth performance. We conduct the SCM analysis using a pool of all countries in the world, excluding those that were involved in or significantly affected by the conflict. The vector of predictors that is selected to explain real GDP includes employment (employers per hundred persons), trade openness (trade as percentage of GDP), industry shares (agriculture and industry as percentage

FIGURE 6 • Worldwide Governance Indicators, Syria
(Percentile rank among all countries ranges from 0 (lowest) to 100 (highest))

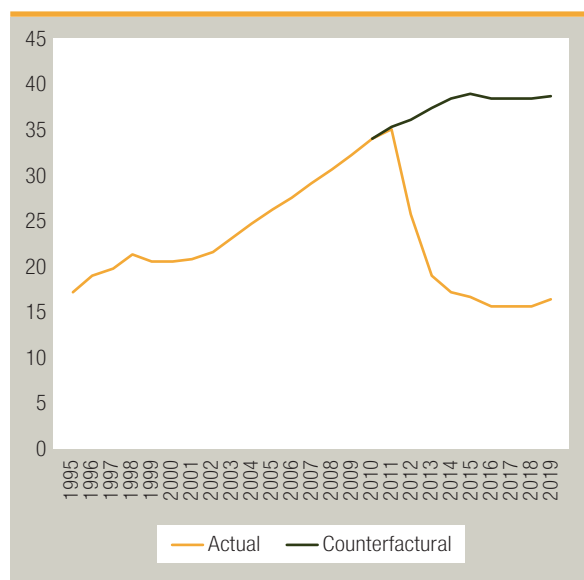


Source: Worldwide Governance Indicators report (various years).

Through an SCM analysis, we estimate that in 2019, Syria's GDP absent the conflict (the counterfactual) would have been US\$ 38.6 billion in 2015 constant prices, compared to US \$16.3 billion of the realized GDP (Figure 7) (Technical Appendix A).

Conflict, displacement, and the collapse of economic activity have all contributed to the decline in household welfare. Extreme poverty has consistently risen since the onset of the conflict, reflecting deteriorating livelihood opportunities and a progressive depletion of household coping capacity. In non-monetary terms, access to shelter, health, education, and water and sanitation have all worsened dramatically since the conflict began. In addition, human capital has eroded primarily due to the interruption of schooling of the young population.⁷ Preliminary calculations show that the combined effects of casualties, forced dispersion, and reduced investments in human capital could add up to a 30 percent permanent loss in the country's human capital stock (compared with the 2010 stock).⁸ The Human Development Index (HDI) compiled by the United Nations Development Programme (UNDP) positioned Syria 151st out of

FIGURE 7 • Actual and Counterfactual GDP, Syria
(Billions, constant 2015 US\$)



Source: World Development Indicators (WDI); Penn World Table 10.0; Center for Systemic Peace; World Bank staff estimates.

Note: The counterfactual results account for the regional negative impact that growth in the MENA region was lower than the global average in the post-conflict period.

189 countries in 2020, down from 110th out of 169 countries in 2010.⁹

The conflict in Syria also imposed a heavy economic and social toll on the country's neighbors in the Mashreq region. From 2011 to 2018, average annual GDP growth rates were reduced by 1.2 percentage points in Iraq, 1.6 percentage points in Jordan, and 1.7 percentage points in Lebanon

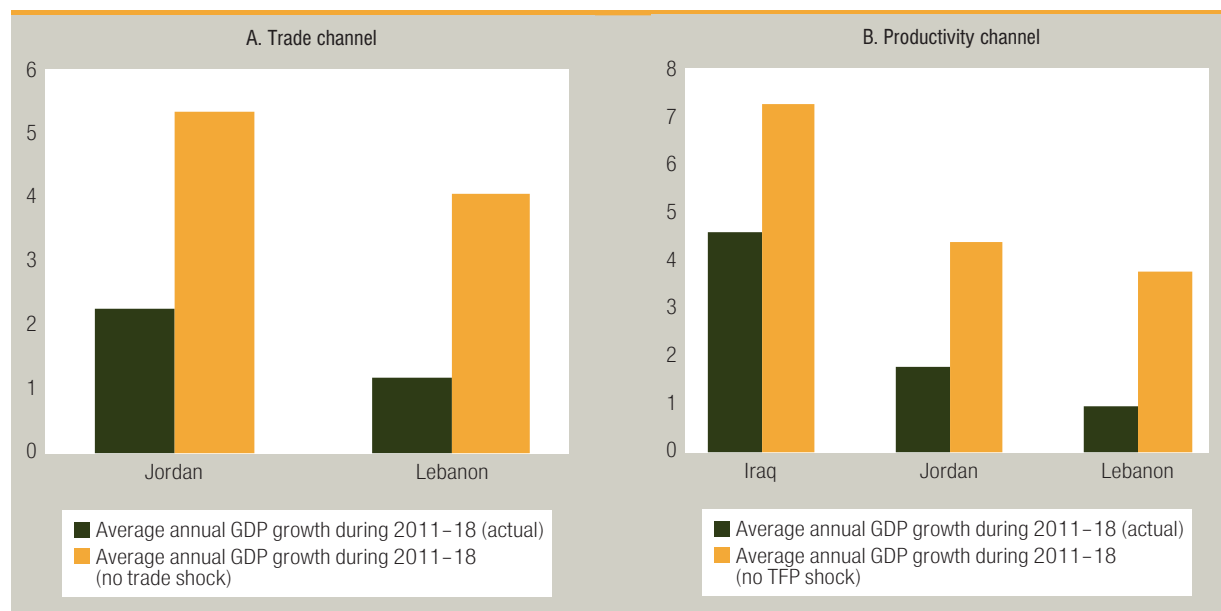
of GDP), investment share (gross capital formation as percentage of GDP), physical capital (capital stock per capita), human capital (human capital index from the Penn World Table), and political status (democracy index). The analysis relies on a cross-country panel data set for the period between 1995 and 2019.

⁷ According to the estimates from the United Nations International Children's Emergency Fund (UNICEF), 2.4 million children have been forced out of school since the start of the conflict.

⁸ Hamilton and Nguyen (2017).

⁹ The HDI measures each country's social and economic development by focusing on the following four factors: mean years of schooling, expected years of schooling, life expectancy at birth, and gross national income (GNI) per capita.

FIGURE 8 • GDP Impact of the Syrian Conflict in the Mashreq Region



Source: The Fallout of War: The Regional Consequences of the Conflict in Syria, June 2020, World Bank.

Note: The computable general equilibrium (CGE) model underlying the simulations is the Global Trade Analysis Project (GTAP) model.

in real terms solely because of the conflict in Syria. Cumulatively, these reductions correspond to 11.3 percent of the combined pre-conflict GDPs in 2010 across these three countries.¹⁰ With decreasing transit trade through Syria and stalling service exports like tourism, the trade shock lowered growth in Syria’s neighboring countries (Figure 8.A). The productivity shocks were also substantial, reflecting the intangible factors that have depressed the growth through stalling total factor productivity (TFP) growth (Figure 8.B). In contrast, refugee arrivals boosted growth by increasing aggregate demand and labor supply. The net negative economic impact of the Syrian conflict on Iraq, Jordan, and Lebanon has been remarkably high compared to similar situations elsewhere in the world over the last few decades, driven by three factors: (i) the sheer scale of the Syrian conflict and ensuing forced displacement; (ii) the high exposure of neighboring countries to a possible fallout; and (iii) the low institutional resilience in neighboring countries, which propagated the shock further.

The prolonged displacement posed profound challenges to the hosting countries in the Mashreq (World Bank, 2020).¹¹ Arrivals of refugees have boosted demand for public services, resulting

in a mix of congestion and fiscal effects. In education and water, adaptations in the provision of services largely prevented congestion. In transport, health, and energy, congestion was observed. Driven by the refugee-induced demand, the fiscal burden through embedded subsidies has increased. In general, Syrian refugees faced adverse conditions in exile.¹² Yet, with persistent concerns regarding insecurity in Syria, return rates for the Syrian refugees are low, leading

¹⁰ The synthetic control method (SCM) is employed to assess GDP in Iraq, Jordan and Lebanon in the absence of a conflict in Syria. For more information, see “The Fallout of War,” (World Bank, 2020).

¹¹ World Bank, “The Fallout of War,” (2020).

¹² For instance, when it came to the war’s impact on school-going children, the school attendance ratio of Syrian children remained higher in Syria than it did in Lebanon or Jordan, mainly because many Syrian refugees had to adopt adverse coping strategies in their countries of asylum; Syrian girls dropped out of school to get married at a younger age and Syrian boys dropped out to bring extra income for their families’ survival. For these children, human capital accumulation stops when they leave school, with persistent effects on their lifetime well-being. For details, see World Bank, “The Mobility of Displaced Syrians,” (2019).

to the continued protracted nature of displacement.¹³ According to the United Nations High Commissioner for Refugees (UNHCR), only about 4 percent (177,500) of the total Syrian refugee population returned to Syria as of March 2022. The COVID-19 pandemic has had a particularly acute impact on displaced refugees who are largely working in the informal sector; this, in turn, has also increased the burden of care on host countries. In Jordan, for instance, according

to a survey conducted in April 2020, the pandemic caused 35 percent of Syrian refugees to lose their jobs, compared to 17 percent of Jordanian citizens.¹⁴

¹³ World Bank, “The Mobility of Displaced Syrians,” (2019).

¹⁴ International Labour Organization (ILO), “Impact of COVID-19 on Workers in Jordan: A Rapid Assessment,” (2020).

RECENT ECONOMIC DEVELOPMENTS

Deteriorating economic situation

Beyond the immediate conflict impact, the Syrian economy suffers from the compounding effects of the pandemic, adverse weather events, regional fragility, and macroeconomic instability. Since 2020, Syria's external economic ties have been severely restrained by the deepening crisis in neighboring Lebanon and Turkey, as well as the introduction of new US sanctions under the Caesar Act.¹⁵ Domestically, a severe drought, worsened by a warming climate and shortages of agricultural inputs, has led to a dramatic reduction in agricultural production.¹⁶ With a severely degraded health care system following the decade-long war, COVID-19 has only exacerbated the vulnerable situation. Since March 2022, soaring prices triggered by the war in Ukraine have been adversely affecting Syria as a net food and fuel importer.

In the absence of an official GDP figure, this report uses nighttime light emissions to infer changes in economic conditions in recent years. With the prolonged conflict, Syria's statistical capacity has taken a heavy blow, and reliable and timely information regarding national accounts have

become inaccessible.¹⁷ Syria's overall score on the World Bank's Statistical Capacity Indicator (SCI),¹⁸

¹⁵ The Caesar Syria Civilian Protection Act of 2019, also known as the Caesar Act, is US legislation that sanctions the Syrian government, including Syrian president Bashar al-Assad, for war crimes against the Syrian population. The Act was signed into law by President Trump in December 2019 and came into force on June 17, 2020.

¹⁶ According to Food and Agriculture Organization (FAO), wheat production in 2021 is estimated at around 1.05 million tonnes, down from 2.8 million in 2020 and only one-quarter of the pre-crisis average of 4.1 million tonnes during the period 2002–2011.

¹⁷ Syria still uses the 1993 System of National Accounts (SNA) methodology with a base year of 2000, suggesting the benchmark estimates have a lag of nearly 20 years. For comparison, in 2020, the benchmark estimates in about 64 percent of economies worldwide had a lag of less than ten years. Furthermore, 63 percent of economies worldwide had reported their national accounts in line with the new versions of 2008 SNA or 2010 European System of Accounts (IMF, 2022).

¹⁸ The World Bank's Statistical Capacity Indicator is a composite score assessing the capacity of a country's statistical system. It is based on a diagnostic framework assessing the following areas: methodology; data

which used to be in line with the average of the MENA region, has declined sharply since the conflict, ranking last among the 146 countries surveyed in 2020. To overcome this serious limitation to economic monitoring, we make use of nighttime lights (NTLs), which provide an important source of information about economic activity. In Syria, NTLs have shown

a strong correlation with the historical movements of GDP. Through a quantitative analysis of the relationship between NTLs and economic activity, we estimate that Syria's real GDP growth slowed from 3.7 percent in 2019 to 1.3 percent in 2020 and then turned negative, to -2.1 percent, in 2021 (see Box 1 and Technical Appendix B for details).

BOX 1: NOWCASTING ECONOMIC ACTIVITY USING NIGHTTIME LIGHTS

Nighttime lights (NTLs) are an important source of information about economic activity in Syria, significantly expanding and enriching the information set. NTLs data are high frequency, granular, and insulated from human error or misuse (e.g., misinformation). As such, they are particularly welcome in a conflict context as they provide more timely, granular (spatial information is readily available), comprehensive (they cover 100 percent of Syria's territory), and potentially more reliable information than official national accounts data.

In Syria, NTLs have shown a strong correlation with historical movements of GDP. Both NTLs and GDP climbed steadily from 1992 until 2010, although the growth in GDP was relatively higher in later years (Figure 9.A).^a NTLs decreased significantly since the start of conflict, corroborating the large decline in real GDP. It was only in 2017 that NTLs began to recover, but they declined again in 2021. The regression of NTLs against real GDP in logarithmic form reveals a positive and significant relationship between the two. Specifically, the coefficient for this regression is 0.726, suggesting that for every 1 percent increase in NTLs, real GDP increases by almost three-quarter of a percent. Although this estimate is slightly higher than the estimates of Henderson (2012), it remains within the 95 percent confidence interval, giving some additional confidence to the estimate.

The conflict in Syria has substantially changed the relationship between NTLs and GDP. The post-conflict estimate of the elasticity between NTLs and GDP is only half, approximately, of the magnitude of the pre-conflict estimate (Table 1: Regression results of historical NTLs and real GDP). The lower elasticity between NTLs and GDP could be partly explained by the sharp decline in oil-GDP since the start of the conflict.^b It may also indicate that the official GDP may not have adequately reflected the dramatic changes in economic activity after the conflict. Indeed, if applying the pre-conflict estimate of the elasticity between NTLs and GDP to predict Syria's GDP after the conflict, the economic contraction in Syria between 2010 and 2017 would be worse than Syrian statistics suggested.

The evolution of NTLs by subnational regions allows us to understand the spatial dynamics of economic activity in Syria. In general, most areas exhibit a U-shaped pattern beginning in 2014 and bottoming out in 2017 (See Technical Appendix B). However, large variation exists across regions. By 2021, some regions had a level of economic activity that was still far lower than it was pre-conflict, while a few have recovered close to their pre-conflict levels. Overall, there appears to be a sharper decline in economic activity in opposition-controlled areas than in government-control areas since the conflict began. Demonstrating the persistent impact of the conflict, economic activity appears to have fallen more pronouncedly in conflict-intensive regions (Figure 2: Conflict-related casualties in Syria by event year, 2017 and 2021 and Figure 9).

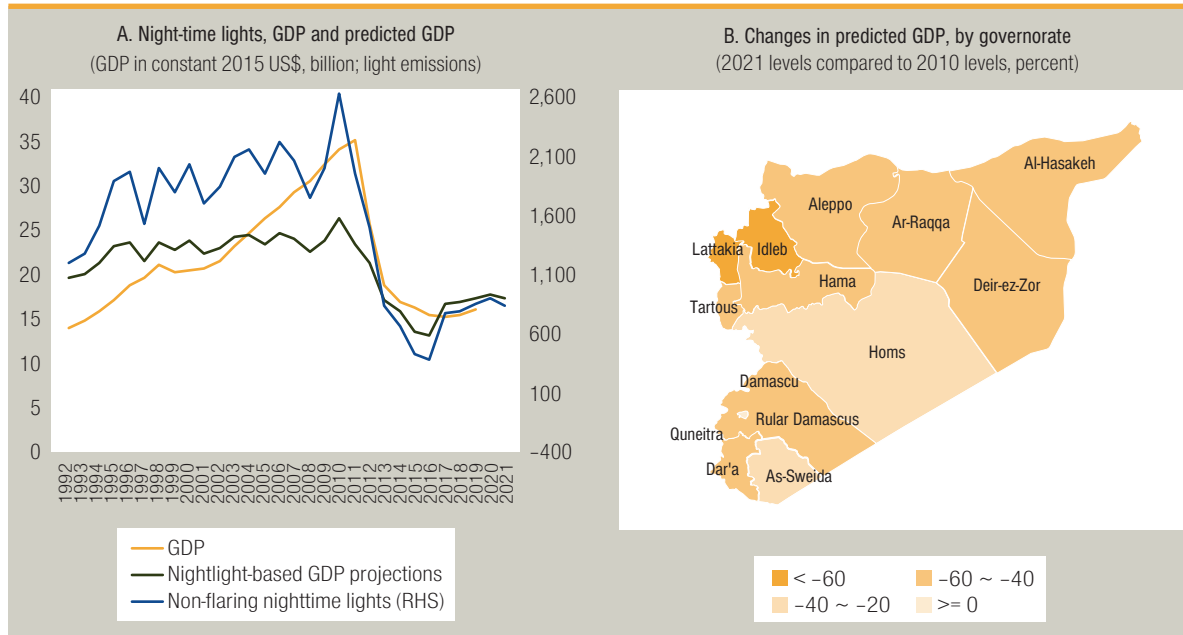
TABLE 1 • Regression Results of Historical NTLs and Real GDP

	(1)	(2)	(3)
Dependent Variable	log(GDP)	GDP	GDP
log(NTLs)	0.726*** (0.009)		
NTLs		0.072*** (0.005)	
NTLs * Pre-Conflict			0.071** (0.008)
NTLs * Post-Conflict			0.038** (0.015)
Observations	28	28	28
R ²	0.823	0.861	0.882
Adjusted R ²	0.879	0.853	0.881

Note: *p<0.1; **p<0.05; ***p<0.01.

(continued on next page)

FIGURE 9 • Night-Time Lights and GDP



Source: The Visible Infrared Imaging Radiometer Suite (VIIRS) and Defense Meteorological Satellite Program (DMSP) satellites; WDI; World Bank staff estimates.
 Note: NTLs are regressed against real GDP in logarithmic form. The elasticity estimates acquired from the regression are applied to convert the NTLs observations into regional GDP. See Technical Appendix B for details.

^a To carve out the effects of flaring, we estimate the Sum-of-Lights for all areas that have been tagged as flaring sites by the World Bank's Global Gas Flaring Reduction Partnership (GGFRP) dataset. This carves out these extremely bright lights that otherwise bias the estimates, allowing us to focus only on conventional sources of electrical lights. This is particularly important in the case of Syria, as flaring nearly quadrupled in early 2017 while remaining relatively flat otherwise.
^b If the non-oil GDP data is available, non-flaring NTLs are more appropriate to be regressed against non-oil GDP rather than aggregate GDP. Non-oil GDP roughly accounted for 10 percent of GDP in Syria before the conflict (IMF, 2016). As such, regressing non-flaring NTLs against aggregate GDP would result in a about 10 percent overestimation of the elasticity (between non-flaring NTLs and non-oil GDP) prior to the conflict. With oil production plummeting after the war, aggregate GDP became closer to non-oil GDP since the conflict began. Hence, the elasticity is overestimated less during the post-conflict period.

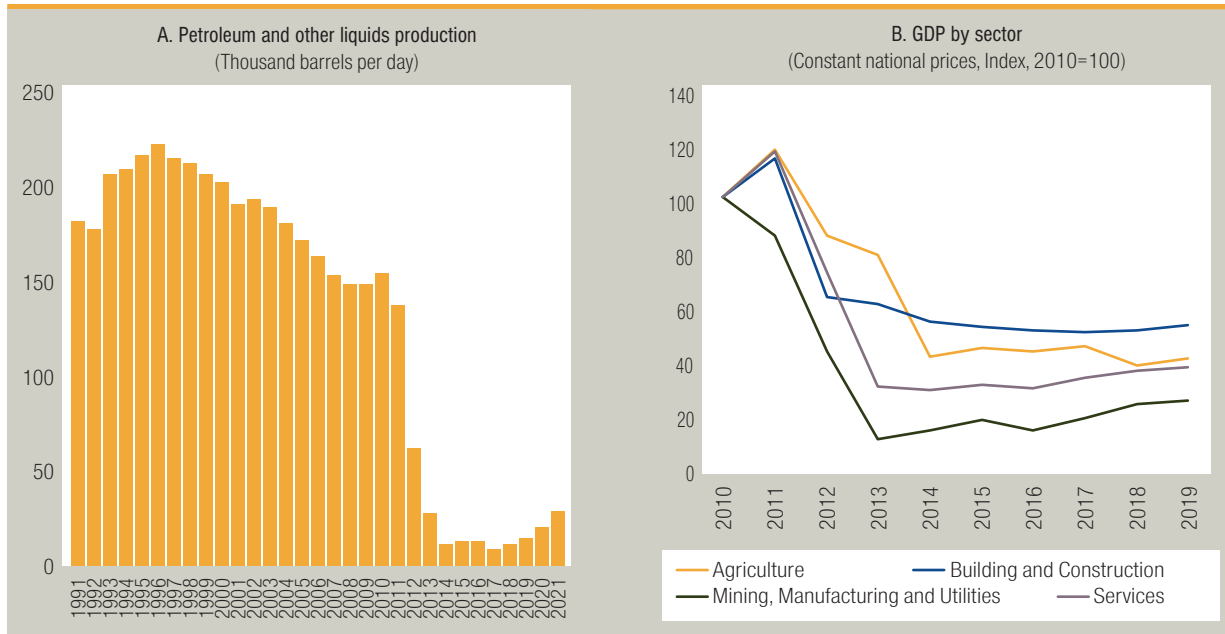
Economic activity has shrunk significantly in conflict-intensive regions. The spatial dimension of developments takes on a critical dimension in fragile, conflict, and violence (FCV) contexts: averaging across areas of the country can be highly misleading, as conflict intensity varies widely across time and space, which in turn generates large heterogeneity of economic and social conditions across time and space. Statistics on regional economic output, typically measured as regional GDP, do not exist for Syria. Alternatively, NTL-based outputs are estimated to predict economic activity at the governorate level. As the estimates suggest, since the conflict began, there appears to have been a sharper decline in the predicted GDP in opposition-controlled areas than in

government-control areas, and in governorates where active conflict was concentrated (Box 1). In Lattakia and Tartous, two port cities that have experienced only limited conflict or destruction, the decline in NTL-based outputs were also significant, likely caused by a collapse in trade activity. In contrast, according to a study conducted by Mercy Corps in 2021 using more granular NTLs data,¹⁹ economic activity appears to have been quite robust in some border areas,

sources; and periodicity and timeliness. Countries are scored against 25 criteria in these areas, using publicly available information and/or country input.

¹⁹ See Mercy Corps, "Using Night Lights to Measure Economic Output in Syria," (May 27, 2021)).

FIGURE 10 • Economic Activity in Syria



Source: Central Bureau of Statistics of Syria; US Energy Information Administration (EIA).

especially where significant economic activity is taking place on the other side of the border.²⁰

Economic activity has contracted across sectors since the onset of the conflict. Economic disruption has been acute in the hydrocarbon sector. Crude oil production plunged by 80 percent from 2010 to 2021 (i.e., from 416,000 barrels per day (bpd) to 79,000 bpd),²¹ owing largely to the conflict-caused damages to energy infrastructure networks (Figure 10.A). There were significant losses in agricultural production as a result of damage to irrigation systems, adverse weather events, and shortages of labor, seeds, fertilizer, and fuel. Industrial production also declined, affected by shortages in fuel and power, limited access to capital, severe destruction of infrastructure, and the relocation of major manufacturing bases. The service sector was disrupted as economic fragmentation impeded trade and commerce, security threats prevented tourism, and economic sanctions impacted financial activities (Figure 10.B).

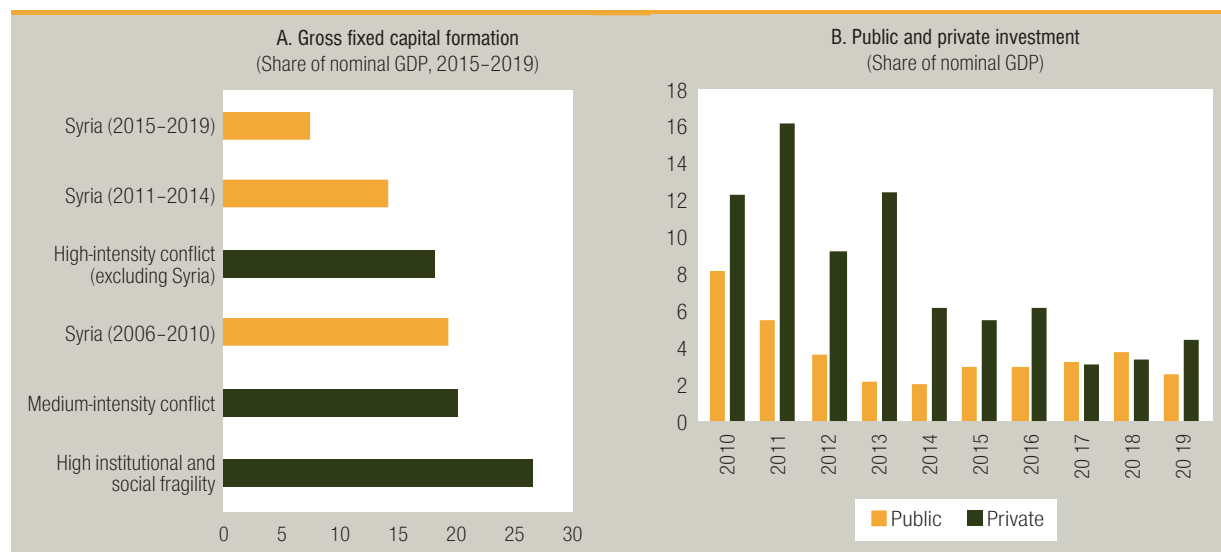
From the demand side, the conflict has led to a collapse in both private and public investment. The final consumption expenditure data in real terms in national accounts is less reliable, as evidenced by a lack of close correlation between the Consumer Price Index (CPI) and the price deflator

for private consumption expenditures in national accounts. The assessment of the demand-side GDP therefore focuses on investment only. Before the conflict, Syria's investment as a share of GDP was comparable to that of neighboring countries. Investment declined from 19.2 percent of GDP in 2006–2010 to 14.2 percent of GDP during 2011–2014, then to 7.6 percent of GDP during 2015–2019, an extremely low contribution even among fragile and conflict-affected economies (Figure 11.A). Investors exited Syria due to insecurity and the poor business environment, causing private investment as a share of GDP to decline from 12.3 percent in 2010 to 4.4 percent in 2019. During this period, public investment also fell substantially, from 8.2 percent of GDP to 2.5 percent of GDP, as revenues declined and spending on arms rose (Figure 11.B).

²⁰ Possible explanations could be smuggling, and the income derived from smuggling, which has become a major part of the economy. Firms may stay closer to foreign suppliers of parts, as the border for exports is much more valuable, given that logistics within a conflict country impose huge costs to firms.

²¹ According to US Energy Information Administration (EIA) data.

FIGURE 11 • Investment in Syria



Source: Central Bureau of Statistics of Syria; Find My Friends Tool using the IMF World Economic Outlook (WEO); World Bank staff estimates.
 Note: The classification is from the FY22 list of fragile and conflict-affected countries situations, released by the World Bank.

Persistent current account deficit and dwindling foreign reserves

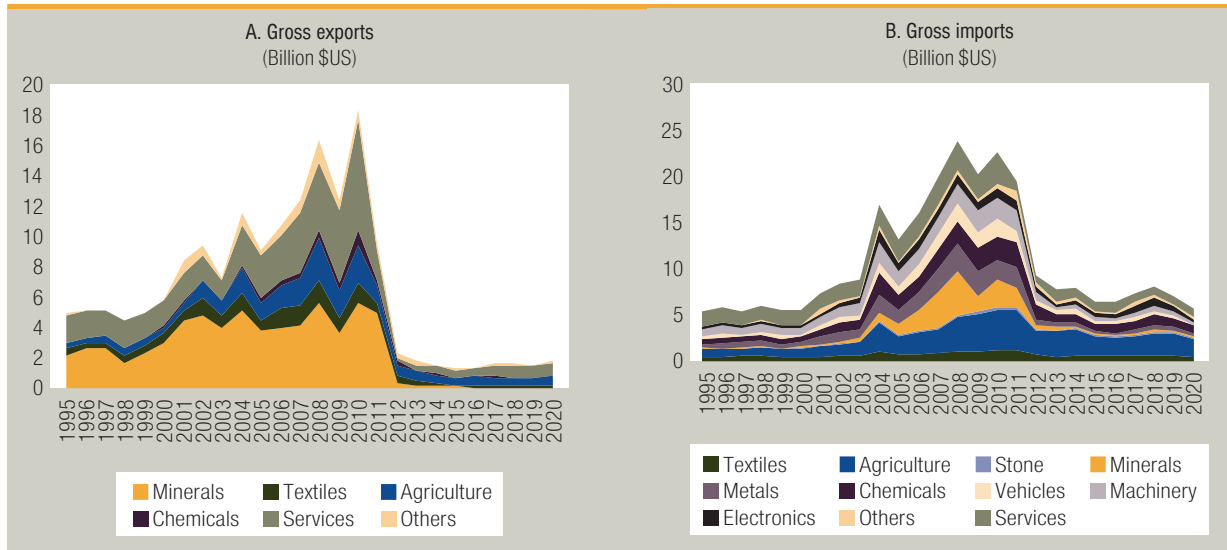
Conflict-related disruptions and international sanctions led to a collapse of Syrian trade after the conflict. According to data released by the Central Bank of Syria (CBS), Syria's exports fell dramatically, from US\$ 15.7 billion in 2010 to US\$ 3.5 billion in 2019. Mirror statistics from the UN Comtrade database show a similar declining trend but lower export levels in recent years. Exports plummeted, largely driven by a dramatic decline in oil and tourism receipts. Earnings from these sectors, which amounted to about US\$ 12.8 billion in 2010, are now insignificant due to conflict-related disruptions and sanctions (Figure 12: Dynamics of Syrian trade.A). In 2020, Syria exported primarily agricultural goods, such as olive oil, seeds, and nuts. Top five destination for Syrian exports were Turkey, Saudi Arabia, Lebanon, Egypt, and United Arab Emirates, according to the mirror statistics from the UN Comtrade database. The prolonged civil war has led to a collapse in domestic industrial output and agricultural supply, making the country heavily reliant on manufactured goods and foodstuffs produced overseas. Consequently, although imports also contracted since the conflict began, the decline is less significant than that of exports, which dropped from US\$

19.8 billion in 2010 to US\$ 7.7 billion in 2019, according to the official statistics (Figure 12: Dynamics of Syrian trade.B). In 2020, the top five suppliers of Syria's imports were Turkey, China, United Arab Emirates, Egypt, and India, according to the mirror statistics from the UN Comtrade database. These figures should be treated with caution. In particular, the introduction of sanctions in Syria may trigger evasion strategies, causing a larger share of trade unreported since the conflict. Therefore, the contraction in trade activity could be smaller than the trade statistics suggest.

Estimates from the maritime data suggest the trade volume may have further moderated amid crisis conditions since 2020. In the absence of recent official trade statistics, we apply maritime data from the Automatic Identification System (AIS), which has emerged as a potential source for real-time information on trade activity.²² Maritime data provides

²² Over 80 percent of global merchandise trade by volume and more than 70 percent of its value is carried by the international shipping industry (United Nations Conference on Trade and Development (UNCTAD, 2018). Cargo ships are equipped with a device that periodically emits a signal (Automatic Identification System message, or AIS), which contains information on the vessel's location, speed, draught, etc.

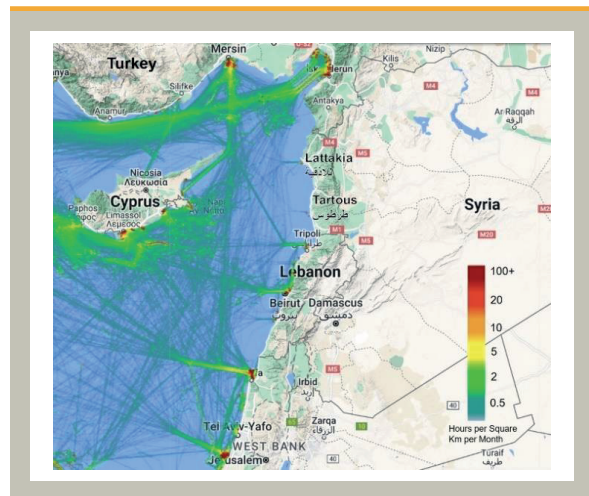
FIGURE 12 • Dynamics of Syrian Trade



Source: Central Bureau of Statistics of Syria; Atlas of Economic Complexity, Center for International Development at Harvard University; World Bank staff estimates.
 Note: The analysis uses mirror data from the UN Comtrade database.

a good indication of trade activity in Syria, as the country is heavily dependent on maritime transport for trade.²³ The limitation of this data lies in the fact that ships may not be equipped with a device that periodically emits a signal, and ships seeking to evade seizure or engaging in illegal activities may turn off their AIS transporters near Syrian waters. Syria is served by two primary ports along its Mediterranean coastline, in Lattakia and Tartous. Although the conflict has not touched either port, activity in both has declined sharply. By June 2021, Syria’s coastline had a much lower maritime traffic density than any of its neighbors (Figure 13). Estimates from the maritime data suggest Syria’s import volume in terms of metric tons has more than halved from 2019 to 2021, possibly due to new policies that have restricted the imports of non-essential goods (Figure 14.A and Figure 14.B). Mirror statistics from the UN Comtrade database show a similar decline for imports in value terms in recent years. Despite the negative impact of the COVID-19 outbreak and disruptions in supply chains, maritime data show that the declining trend in exports between 2010 and 2019 appears to have reversed from 2019 to 2021. For 2020, when data from both sources are available, the uptick of seaborne export volume is consistent with the trends revealed by mirror statistics from the UN Comtrade

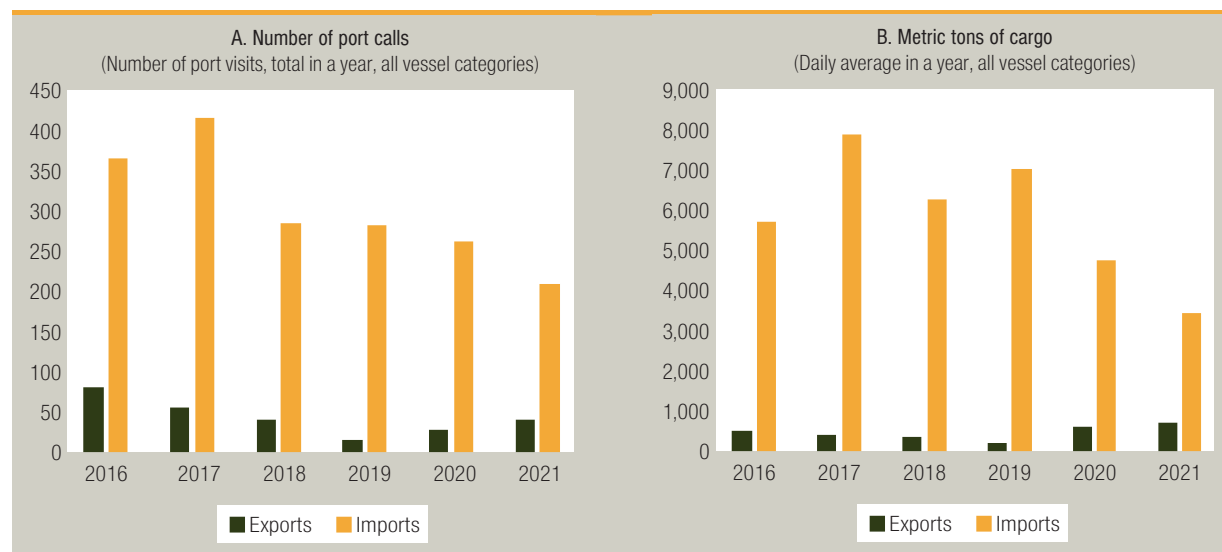
FIGURE 13 • Shipping Density Map (June 2021, all vessel categories)



Source: European Marine Observation and Data Network (EMODnet).
 Note: The platform utilizes AIS shipping-position data collected by MarineTraffic. It assesses import and export vessel capacity measured in deadweight tons (DWT) by country and ship type, and then uses machine-learning algorithms to estimate metric tons of cargo carried.

²³ According to the World Trade Organization (WTO), for Syria, 74.6 percent of imports and 26.8 percent of exports, respectively, were carried by sea in 2011. https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/SY_e.pdf.

FIGURE 14 • Seaborne Trade Volume of Syria



Source: Cerdeiro, Komaromi, Liu and Saeed (2020); UN Comtrade Monitor; World Bank staff estimates.

database. Syria's improved trade relations with its Arab neighbors may have contributed to a possible increase in exports since 2019.²⁴

Syria has experienced a persistent current account deficit since the onset of the conflict.

Constrained by sanctions and trade embargos, exports remained substantially lower than imports, resulting in persistent high trade deficits. The losses were partly offset by net transfer inflows, which accounted for an average of 11 percent of GDP during 2011–2019, according to the official balance of payments (BoP) statistics. Notably, net remittance inflows increased from US\$ 1.1 billion in 2010 to US\$ 1.6 billion in 2019, primarily driven by increased remittances inflows from refugees and migrant workers.²⁵ According to the same official BoP statistics, the increase in transfer inflows was also driven by international aid to Syria, which climbed to US\$ 1.5 billion in 2019 from a negligible amount prior to the conflict (Figure 15.A).²⁶ As a result, Syria's current account deficit as a percentage of GDP decreased from a peak of 32 percent in 2014 to single digits in recent years, according to the official balance of BoP statistics (Figure 15.B).

Syria's foreign exchange reserves are estimated to have been almost completely depleted.

Reflecting the impact of sanctions and conflict, Syria experienced major capital flight since the start of the conflict. Meanwhile, net foreign direct investment (FDI),

which exceeded US\$ 2 billion in 2010, disappeared after 2011. Syria's reserve losses were partly limited by about US\$ 7 billion in credit lines provided by the Iranian and Russian governments.²⁷ Yet, financial assistance from these allied countries is insufficient to cover a large

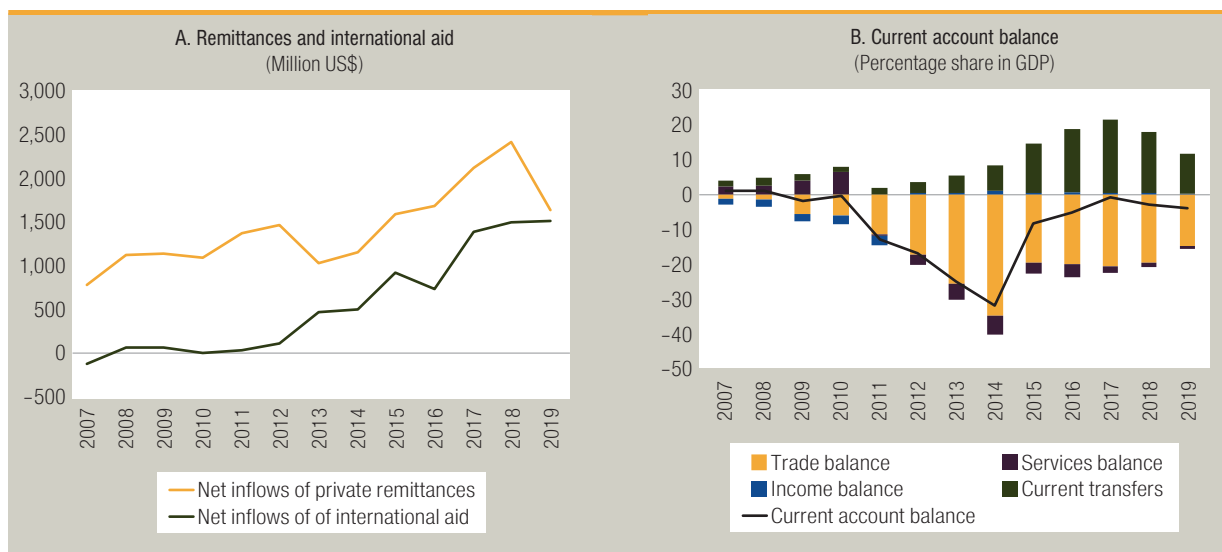
²⁴ Jordanian authorities announced the reopening of the Jaber border crossing with Syria for cargo and passengers, as of September 29, 2021. Syria and Pakistan signed a memorandum of understanding to boost bilateral trade and expand economic ties on October 31, 2021. The Syrian president visited the United Arab Emirates (UAE) on March 18, 2022; his first trip to an Arab country since 2011.

²⁵ Remittance inflows were reported at US\$ 2.1 billion in 2017, according to the official balance of payments (BoP) statistics. Including informal remittance inflows, the estimates provided by Economic and Social Commission for Western Asia (ESCWA) were much higher, at US\$ 8.5 billion, over the same year.

²⁶ The reported humanitarian donor funding for Syria was US\$ 2.4 billion in 2019, according to data collected by the UN Financial Tracking Service (FTS).

²⁷ Syria reportedly received from the Iranian government lines of credit amounting to US\$ 1.9 billion in 2013, US\$ 3 billion in 2014, US\$ 0.97 billion in 2015, and US\$ 0.5 billion in 2017. In addition, according to an agreement signed by the Syrian and Russian ministers of finance and reviewed by The Syria Report, Russia granted Damascus EUR 240 million in May 2014. Recently, Syria signed a contract for a Russian loan of US\$ 700 million in December 2020.

FIGURE 15 • Syria's Balance of Payments



Source: Central Bureau of Statistics of Syria; Central Bank of Syria; World Bank staff estimates.

Note: "Workers' remittances" plus "compensation of employees" from the balance of payments are used to estimate remittances, while "government transfers" plus "other transfers" are applied to estimate international aid.

cumulative current account deficit that amounted to US\$ 34 billion from 2011–2019, according to the official statistics. This accumulated deficit in Syria's balance of payments since the conflict began suggests its foreign exchange reserves of US\$ 19.5 billion in 2010 may have been almost completely depleted.²⁸

Currency depreciations and surging inflation

Since the start of the conflict, the Syrian pound has continuously depreciated against the US dollar.

The official exchange rate of the Syrian pound (SYP) has declined 50-fold against the US dollar (US\$) since 2011, reaching 2,512 SYP/US\$ in May 2022. The market exchange rate, on the other hand, registered an 80-fold depreciation during the same period, reaching 3,905 SYP/US\$ (Figure 17). The Central Bank of Syria has taken many measures to ease currency depreciation, including curtailing foreign currency demand, tightening import licensing, raising the interest rates on Syrian pound deposits, and obliging exporters to surrender foreign currency earnings to the central bank to help raise US dollar liquidity. Nevertheless, the ability of the authorities to intervene effectively to support the currency has

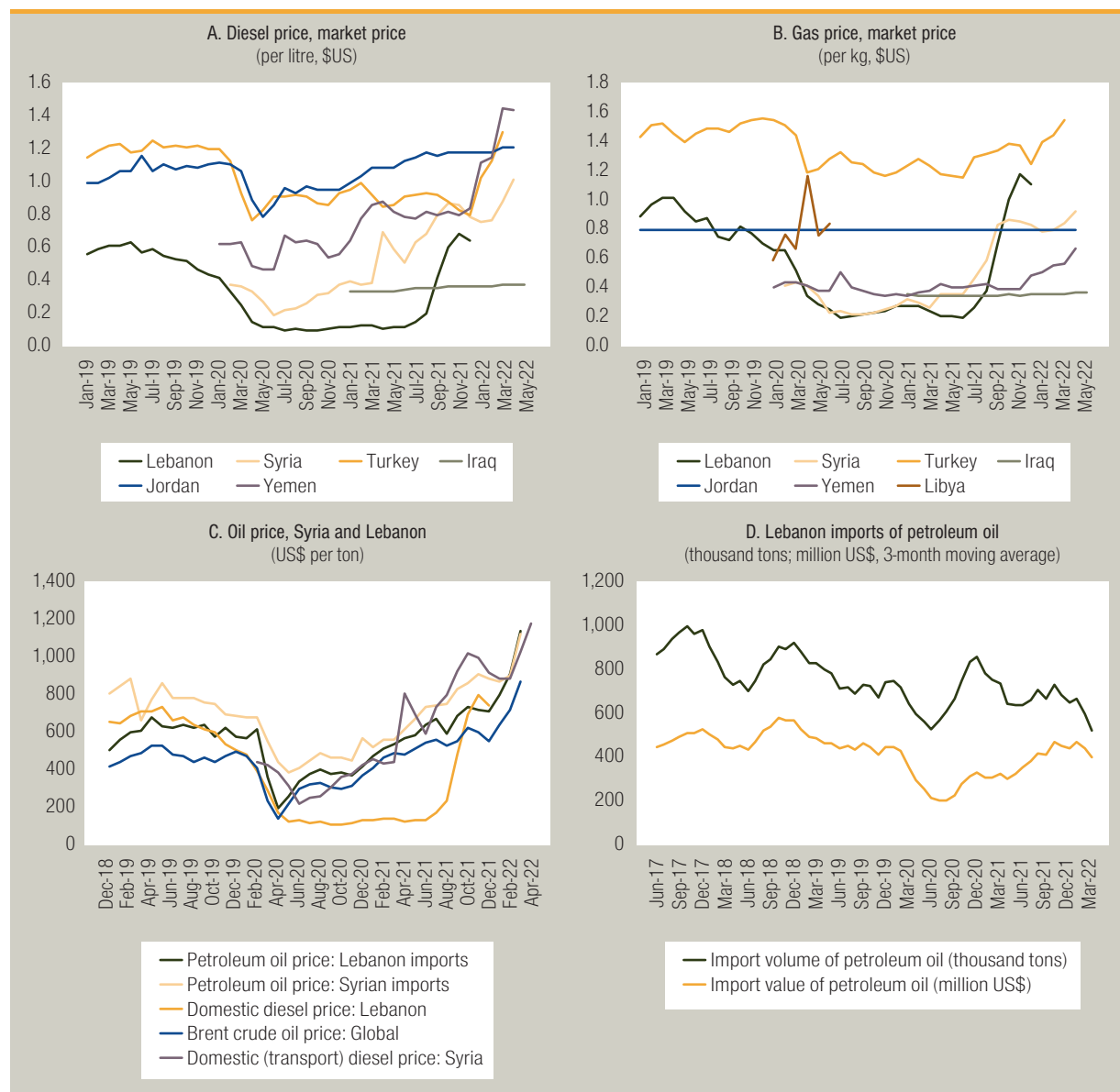
proven limited, as evidenced by the continuous depletion of foreign reserves.

The depreciation of the Syrian pound gained momentum with the start of the Lebanese currency crisis in late 2019. Following the onset of Lebanon's financial crisis, the correlation between the movements and volatilities of the Lebanese Pound (LBP) and SYP increased (See Box 2 and Technical Appendix C for details). The close commercial and trade ties between Lebanon and Syria as well as Syrians' reliance on Lebanese banks for their commercial and personal activities can explain the tight link between the Syrian and Lebanese pounds prior to July 2021.²⁹ Furthermore, Syrian businesses' reported use of the Lebanese black market to obtain US dollars and avert the sanctions of the Caesar Act, coupled with the smuggling

²⁸ Judging from the fact that the authorities have aggressively restricted imports of non-critical goods since 2019, Syria's current foreign exchange reserves should be very tight indeed.

²⁹ A study conducted by Professor Ali Kanaan of the University of Damascus estimated that Syrian deposits in Lebanon worth around US\$ 45 billion, roughly the same size as Syria's GDP. See Asharq Al-Awsat, "Damascus Estimates Syrian Deposits in Lebanese Banks Worth \$45 Billion," (2020).

FIGURE 16 • Fuel Prices and Fuel Imports in Selected MENA Countries



Source: WFP Price Bulletin, country office reports; UN Comtrade database, World Bank staff estimates.

of subsidized goods, gasoline, and diesel from Lebanon to Syria, have created exchange market pressures and simultaneous demand for US dollars in Syria and Lebanon. This, in turn, led to a tightening in the link between the two currencies.

The link between the two currencies weakened after September 2021, the date of the termination of subsidies in Lebanon, which indicates the easing of simultaneous exchange market pressures. This apparent decoupling in the movement of the two currencies is likely to be

explained, in part, by the lower demand for dollars in Syria to purchase the smuggled subsidized goods, gasoline, and diesel from Lebanon after the termination of subsidies. Indeed, owing to the subsidies that were terminated only in September 2021, the prices of diesel and gasoline in Lebanon were the lowest among the comparators: Syria, Iraq, Turkey, Yemen, Libya, and Jordan, some of which are fuel-rich countries (Figure 16.A, Figure 16.B, and Figure 16.C). This created a strong incentive for smuggling, particularly given that the centers of

BOX 2: CONNECTEDNESS BETWEEN THE SYRIAN AND LEBANESE POUNDS

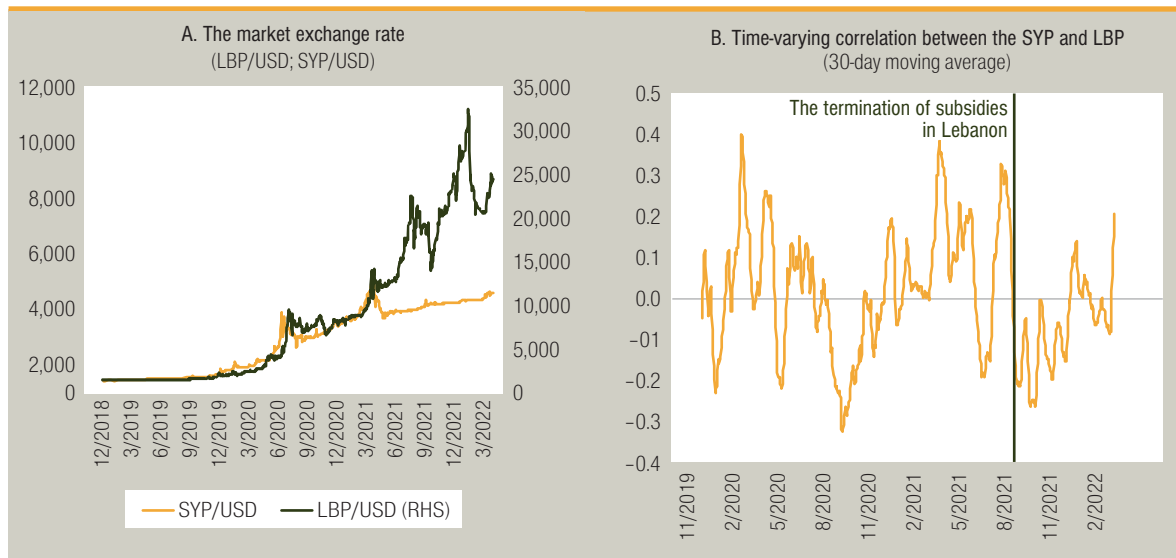
Following the onset of Lebanon's financial crisis, the correlation between the movements in the Lebanese (LBP) and Syrian (SYP) pounds increased (Figure 17.A). Indeed, movements in the LBP and SYP appeared to be closely connected. Further, the two currencies appeared to exhibit common bouts of volatility.

The empirical findings suggest that the changes in the LBP drive the changes in the SYP. More specifically, movements in the LBP have predictive power for changes in the SYP but the converse is not true. That is, the informational content of changes in the LBP is useful for predicting changes in the SYP. This is referred to, in technical parlance, as changes in the LBP Granger-cause changes in the SYP (Table 2: Granger causality tests with the levels and returns of the LBP and SYP).^a The findings also indicate that movements in the LBP lead changes in the SYP.^b

The connectedness between the SYP and LBP can be assessed empirically using econometric techniques offered in the literature. More specifically, the correlation between the movements in the two currencies can be gauged via time-varying correlations or using a multivariate conditional heteroskedasticity model while spillovers in volatility can be measured using the total volatility spillover index of Diebold and Yilmaz (2009, 2012).

The findings also indicate that there are commonalities in the movements and volatilities of the SYP and LBP. More specifically, in the wake of Lebanon's financial crisis, the correlation between the movements of the two currencies increased. The correlation also soared in summer of 2021 and in early 2022. However, there appeared to be a decoupling in the movements and volatilities of the two currencies following the termination of the subsidy scheme in Lebanon in September 2021 (Figure 17: Connectedness between the Syrian and Lebanese Pounds.B). The pattern in the volatility spillovers mimics that of the correlation in the two currencies, in that there was a marked increase in volatility spillovers at the onset of the Lebanese financial crisis in October and November of 2019 and during the summer of 2021, and spillovers in volatility are increasing in early 2022. Moreover, the findings suggest a greater degree of connectedness between SYP and LBP than between any of the latter two currencies and the Turkish Lira.

FIGURE 17 • Connectedness between the Syrian and Lebanese Pounds



Source: The Visible Infrared Imaging Radiometer Suite (VIIRS) and Defense Meteorological Satellite Program (DMSP) satellites; WDI; World Bank staff estimates.

Note: NTLs are regressed against real GDP in logarithmic form. The elasticity estimates acquired from the regression are applied to convert the NTLs observations into regional GDP. See Technical Appendix B for details.

^a A time-series process x_t is said to Granger-cause the other process y_t if exploiting information in the past, and contemporaneous values of x_t lowers the prediction error of the process y_t at some horizon h . That is, the informational content in x_t is useful for predicting y_t .

^b Autocorrelations, which measure the self-dependence in a time series, as well as cross-correlations, can be used to gauge the lead-lag relation between SYP and LBP. The evidence suggests the existence of a lead-lag relation between the SYP and LBP, and that movements in the LBP lead changes in the SYP.

(continued on next page)

BOX 2: CONNECTEDNESS BETWEEN THE SYRIAN AND LEBANESE POUNDS *(continued)*

TABLE 2 • Granger Causality Tests with the Levels and Returns of the LBP and SYP

Panel A: Granger causality tests with returns	F-statistic	p-value
LBP does not Granger Cause SYP	1.84	0.000
SPY does not Granger Cause LBP	0.66	0.969
Panel B: Granger causality tests with levels	F-statistic	p-value
LBP does not Granger Cause SYP	1.44	0.025
SPY does not Granger Cause LBP	0.59	0.991

economic activity in Syria are close to the Lebanese border.³⁰ The smuggling hypothesis is supported by evidence that Lebanon has imported a large volume of oil derivatives before the termination of subsidies (Figure 16.D).

The less precipitous depreciation in the Syrian pound since September 2021 is likely to be partly attributable to the import restrictions that were imposed by the Syrian authorities.

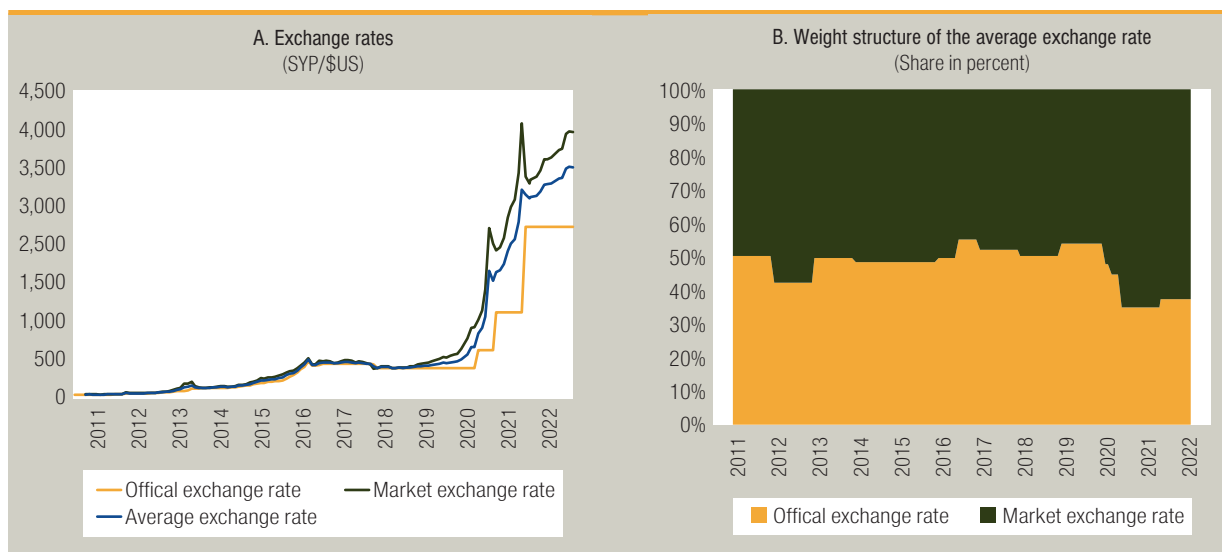
These policies, which restrict the imports of non-essential goods, are aimed at restricting the use of the limited foreign currency reserves to essential food imports, thereby reducing the demand for US dollars. Furthermore, the Syrian authorities have drastically reduced the list of critical goods that are imported at the preferential exchange rates, leading to lower margins of profitability for importers and, hence, a diminished incentive to import. That diminished incentive, along with higher import prices for consumers, also reduced demand for imports. The import-restriction policies likely contributed to the lower volatility of the SYP and to the weakened links between the SYP and LBP since September 2021.

In light of a multiple exchange rate system³¹ and the significant gap between various rates, the report uses consumption-based weights to estimate the average exchange rate effectively in use in Syria. Since 2019, the official exchange rate has become less reflective of the exchange rate effectively in use in Syria, for two reasons. First, the gap between the official and parallel market exchange rates has widened significantly. By May 2022, the market exchange rate was about 55 percent higher than the official

³⁰ The purported increase in smuggling activity along the porous Lebanese-Syrian border is a case in point, illustrating the downside of untargeted subsidies. While smuggling can come from other countries, the transportation costs may be more prohibitive and may affect profitability. Iraq, for example, is farther from major cities in Syria and the transportation costs would, therefore, be higher.

³¹ In Syria, the official exchange rate is used for: (i) the state budget and public sector transactions; (ii) money transfers from abroad through the official channels; (iii) fees paid by Syrian men seeking to avoid mandatory military service; (iv) international aid operations; and (v) imports of critical commodities such as sugar, rice, vegetable oil, and selected medical products. The market exchange rate is applied when private funds are transferred into Syria through unofficial channels. Imports of non-critical goods also apply the market exchange rates. There are other exchange rates in Syria. This includes “the banks and financial institutions” rate, which is used by private banks and financial institutions to conduct transactions, including financing imports and exports of the private sector; the “remittance” rate, which was set by the CBS in April 2013 and is used by Syrians sending money from abroad; the “United Nations” rate, which was set by the CBS in December 2011 and is used by UN agencies operating in Syria; the “military service exemption rate”, which is for Syrian men who want to pay the required fee to be exempted from the mandatory military service. The CBS also issues a customs and airline transactions rate in May 2021. These rates are either close to the official exchange rates, or they are between the official and market exchange rates. See The Syria Report, “Syrian Pound Exchange Rates – Central Bank of Syria and Black Market”, (March 31, 2022).

FIGURE 18 • World Bank Estimated Average Exchange Rate in Syria



Source: Syrian Pound Today; Central Bank of Syria; UN Comtrade database; Central Bureau of Statistics; World Bank staff estimates.

exchange rate (Figure 18.A). Second, the market exchange rate has been used more in transactions: as described above, owing to severe foreign currency shortages, the authorities have drastically shortened the list of critical goods that can be imported, applying the preferential (or official) exchange rate (Figure 18.B). As the Syrian economy is largely consumption-based, we estimate consumption-based weights to gauge the exchange rate effectively in use in Syria. More specifically, we use the official CPI weights to estimate the consumption shares of goods and services of different categories. The mirror statistics from the UN Comtrade database are applied to estimate imports goods and services in specific categories. Then we calculate the average exchange rate, taking into consideration the preference exchange rates applied by the Central Bank for imports of critical commodities and services through time. As of May 2022, Syria's average exchange rate was estimated at 3,390 SYP/US\$ (See Technical Appendix D for details).

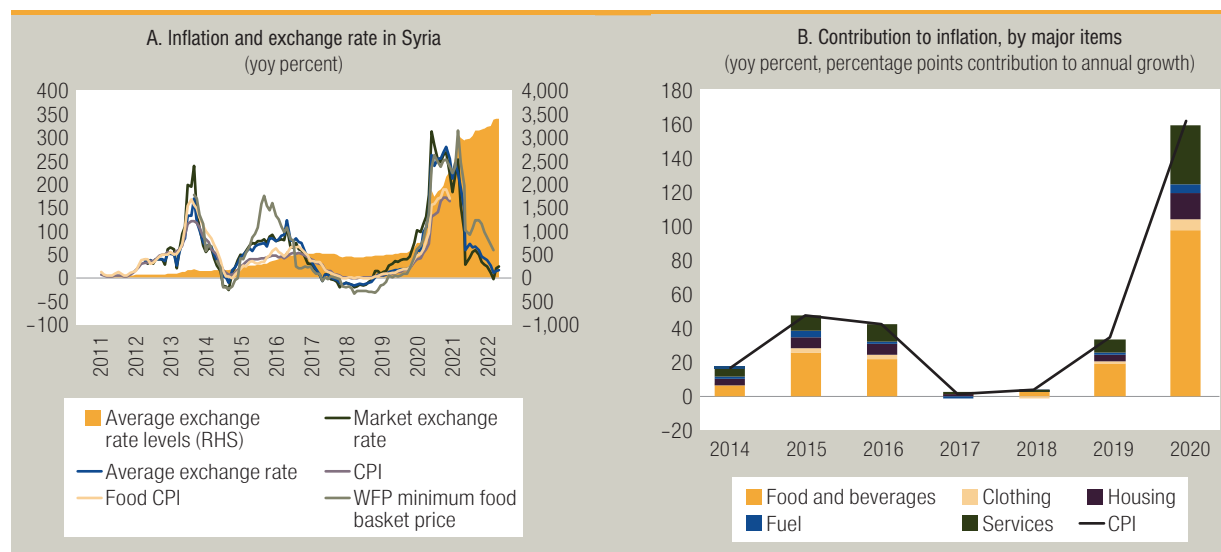
Currency depreciation has triggered high inflation in Syria. In Syria, the annual CPI averaged 38 percent from 2011 to 2020, and it is evident that inflation is highly correlated with the exchange rate (Figure 19.A). Using various empirical approaches, we estimate that the exchange rate pass-through (ERPT) coefficients range from 0.3 to 0.84 in Syria. That is, a depreciation of 100 percent in the Syrian pound

against the US dollar would increase inflation by 30–84 percent at a 12-month horizon (Box 3). This is a relatively high level of pass-through from exchange rate movement to inflation. For comparison, Jašová, Moessner, and Takáts (2019), estimates a yearly pass-through coefficient of 0.222 to 0.231 for the emerging market economies and -0.0127 to 0.00592 for the advanced economies, accordingly.³² Two factors may explain why Syria's inflation is sensitive to the depreciation of the Syrian pound. First, Syria's heavily dependence on imports for essential goods implies that currency falls would quickly feed into higher domestic prices. Second, Syria financed its fiscal deficit primarily through Central Bank borrowing.³³ This undermines the credibility of the Central Bank and unhinges inflation expectations. Furthermore, the time-varying estimates suggest that the pass-through effect of the exchange rate on inflation has increased

³² Jasova, Moessner, and Takáts (2019) estimate the ERPT in the post-2008 crisis using data for a panel of developed and emerging market economies and Generalized Method of Moments (GMM) estimation of a hybrid New Keynesian Phillips curve.

³³ The Syrian authorities have ceased to release data on money supply since the start of the conflict. This prevents a quantitative analysis of money supply and its contribution to high inflation and currency depreciation in Syria.

FIGURE 19 • Inflation in Syria



Source: Central Bureau of Statistics, Syria; WFP Market Price Watch Bulletin; World Bank staff estimates.

markedly following the onset of the Lebanon financial crisis. This increase can likely be attributed to higher inflation expectations in Lebanon, which fed into inflation expectations in Syria amid a sharp increase in currency in circulation, probably in both countries.

CPI rose primarily due to price increases of essential goods and services, disproportionately affecting the poor and vulnerable. In Syria, essential goods and services, including food, clothing, housing, and fuel, account for about three-fourths of the consumption basket. In particular, food alone accounts for about 40 percent of the consumption basket. In fact, food contributed more than half of total headline inflation in Syria over the past few years (Figure 19.B). While the official inflation statistics for 2021 are not available, food prices, as proxied by the World Food Programme (WFP) minimum food basket price index,³⁴ rose by 97 percent yoy during 2021 on top of a 236 percent yoy increase in 2020. The record-high increase in WFP minimum food basket prices in 2021 for Syria was driven by higher global food prices, as well as record low agricultural production due to the severe water crisis and drought-like conditions, as well as a shortage of agricultural inputs.³⁵

The war in Ukraine further shocked commodity markets, pushing food and fuel prices in Syria even higher. In March 2022, adjusted using the World Bank's average exchange rate, WFP minimum

food basket price for Syria in US dollar terms jumped by 28 percent month-over-month (mom), or by 69 percent yoy. Syria's food prices grew faster than the global food prices after the war in Ukraine: the global Food Price Index, a measure of the monthly change in international prices of a basket of food commodities in US dollar terms, rose by 13 percent mom, or by 34 percent yoy, in March 2022. Syria's fuel prices rose roughly in line with the global trends after the war in Ukraine. The market price of transport diesel in US dollar terms increased by 27 percent mom, or by 141 percent yoy in March 2022, respectively. For comparison, the World Bank energy price index in US dollars terms from the Pink Sheet rose by 24 mom, or 102 yoy in March 2022.

Weakening fiscal position

Fiscal revenues dropped with the economic contraction. Estimates using the World Bank's average exchange rate suggest Syria's fiscal revenues

³⁴ The standard food basket is a group of essential food commodities. In Syria, the food basket is set at a group of dry goods providing 2,060 kcal a day for a family of five for a month. The basket includes 37 kg bread, 19 kg rice, 19 kg lentils, 5 kg of sugar, and 7 liters of vegetable oil.

³⁵ North Press Agency, "Syria's Wheat Production Is Lowest In 50 Years," (December 26, 2021).

in US dollar terms fell by 85 percent in 2021 compared to the pre-conflict level in 2010 (Figure 21: Syria's fiscal budget.A). Losses in oil and tax revenues, the collapse of international trade due to sanctions, a growing informal economy, and weak administrative collection capacity all contributed to the revenue shortfall. Tax revenues have decreased more than overall revenues, representing only 34 percent of total budgeted revenues

in 2022, down from 48 percent in 2010. Non-tax revenues accounted for the majority of fiscal revenues, which consist primarily of net profits from public entities and charged fees for government services.

In response to the revenue shortfall, the authorities cut spending, especially capital spending. Between 2010 and 2021, fiscal expenditures declined by 83 percent in US dollar terms.

BOX 3: THE EXCHANGE RATE PASS-THROUGH TO INFLATION IN SYRIA

The exchange rate pass-through (ERPT) measures the extent to which fluctuations in the exchange rate leads to changes in aggregate prices (i.e., inflation). The coefficient is, therefore, akin to an elasticity coefficient in that it measures the sensitivity of the CPI to the exchange rate.

The simplest approach to gauging the ERPT is to estimate the change in the CPI, ΔCPI_t , that is due to a change in the exchange rate, ΔE_t . This estimates the contemporaneous response of the changes in price level to the changes in the exchange rate, $\Delta CPI_t / \Delta E_t$, or to the lagged changes in the exchange rate, $\Delta CPI_t / \Delta E_{t-1}$. Using the exchange rate and inflation data from May 2011 to December 2020, the ERPT coefficients are estimated to range from 0.655 to 0.796 when the Average Exchange Rate (AER) is employed, and from 0.307 to 0.735 when the market exchange rate is employed. This suggests a 100 percent depreciation in exchange rate leads to an increase in the inflation rate ranging from 30.7 to 79.6 percentage points. However, these estimates are subject to considerable uncertainty as evidenced by the high standard deviation of the estimates (Table 3: Estimates of the exchange rate pass-through using the simple approach).

TABLE 3 • Estimates of the Exchange Rate Pass-Through Using the Simple Approach

	Average exchange rate		Market exchange rate	
	Average	Standard Deviation	Average	Standard Deviation
$\Delta CPI_t / \Delta E_t$	65.53	302.63	73.53	273.57
$\Delta CPI_t / \Delta E_{t-1}$	79.56	437.14	30.69	357.54

Estimates of the ERPT coefficient can also be obtained from more elaborate econometric models. The existing literature commonly employs well-specified Vector Autoregressive (VAR) models to gauge the response of prices to an exchange rate shock (see Technical Appendix E for details). The advantage of the latter approach is to allow for discerning the effects of exchange rate fluctuations on inflation over several horizons (one, six, or 12 months). In this analysis, the cumulative effect of the exchange rate shock on inflation over a horizon of 12 months can be interpreted as the pass-through. Using the AER and the CPI data from May 2011 to December 2020, the ERPT coefficient is 0.47 when the VAR is estimated in changes in levels (of AER and CPI) and 0.35 when the VAR is estimated in log-levels (of AER and CPI). If the market exchange rate is employed, the corresponding ERPT coefficients are 0.42 and 0.30 percent, respectively (Table 4).

TABLE 4 • Cumulative Effect of an Exchange Rate Depreciation Based on VAR Models

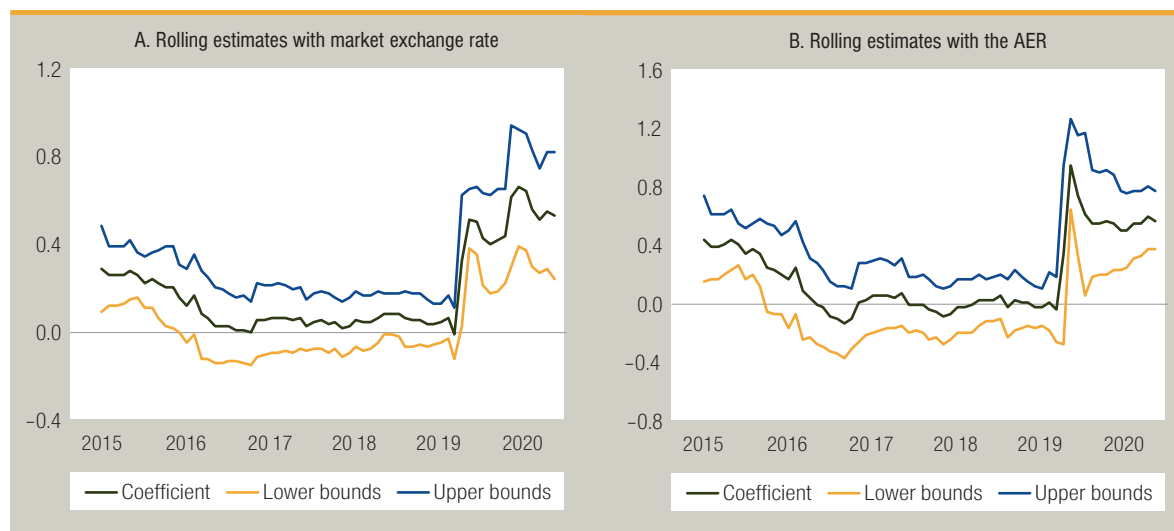
	Average exchange rate	Market exchange rate
VAR in differences in levels	0.47	0.42
VAR in log-levels	0.35	0.30

In line with the literature (see, for example, Gopinath, Itskhoki, and Rigobon, 2010), standard exchange rate pass-through regressions are also employed to gauge the ERPT coefficient. The ERPT coefficient is 0.84 when the market exchange rate is employed and 0.80 when the AER is employed. The time-varying estimates suggest that the contemporaneous effect of the exchange rate on inflation appears to have increased significantly following the onset of the Lebanon financial crisis in October 2019 (Figure 20.A and Figure 20.B). This increase is likely to be attributable to higher inflation expectations in Lebanon, owing to a sharp increase in currency in circulation, which fed into inflation expectations in Syria.

(continued on next page)

BOX 3: THE EXCHANGE RATE PASS-THROUGH TO INFLATION IN SYRIA (continued)

FIGURE 20 • Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation

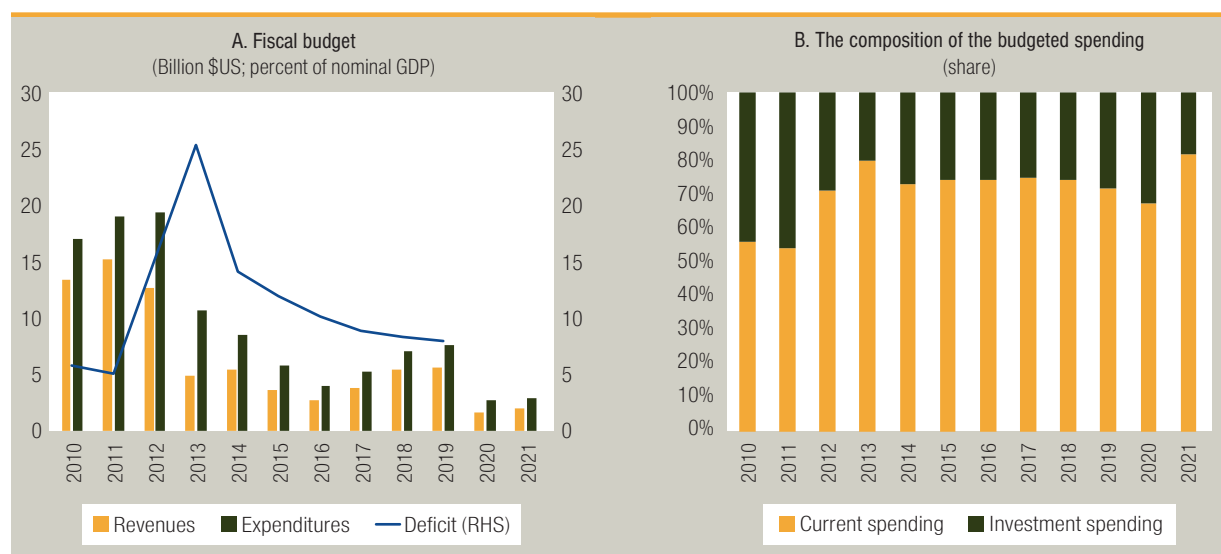


Source: Central Bureau of Statistics, Syria; World Bank staff estimates.
 Note: The graphs provide (rolling window) estimates of the contemporaneous coefficient measuring the effect of exchange rate changes on inflation in standard pass-through regression à la Gopinath, Itskhoki, and Rigobon (2010) along with the 95 percent confidence intervals.

Given the mounting immediate needs of its population, a vast majority of fiscal expenditures is devoted to current spending. Only 15 percent of fiscal expenditures in 2022 were planned on capital expenditures, compared to 44 percent in 2010 (Figure 21.B).

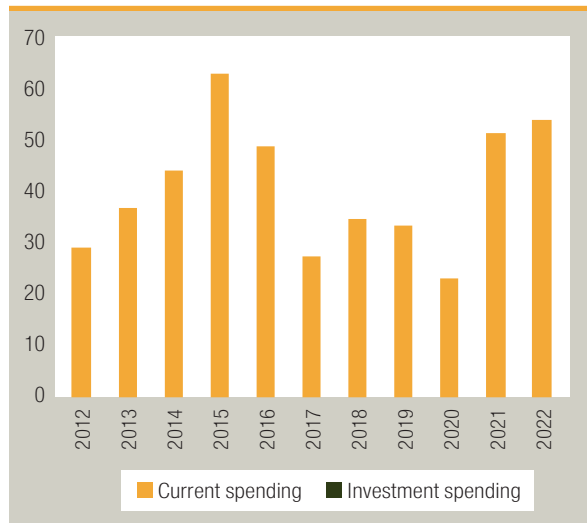
The authorities have managed to reduce wage bills from 20 percent of total planned expenditures in 2010 to 12 percent in 2022. Fiscal subsidies were also cut, temporarily, from a peak of 63 percent of expenditures in 2015 to 23 percent in 2020.

FIGURE 21 • Syria's Fiscal Budget



Source: Central Bureau of Statistics of Syria; Central Bank of Syria; World Bank staff estimates.
 Note: The fiscal data pertains to the Central Government in Damascus and excludes all taxes, transfers, and expenses incurred by the autonomous region in northeastern Syria.

FIGURE 22 • Share of Subsidies in Budget Expenditures in Syria (percent)



Source: World Bank estimates using various Syria Ministry of Finance (MOF) reports; World Bank staff estimates.

Note: The fiscal data pertains to the Central Government in Damascus and excludes all taxes, transfers, and expenses incurred by the autonomous region in northeastern Syria. Estimates include off-budget subsidies for electricity.

Since 2021, fiscal subsidies have risen dramatically, representing more than half of

total expenditures (Figure 22). Subsidies for food and fuel products accounted for a vast majority of budgeted subsidies. In addition, electricity subsidies, which were not included in the budgeted subsidies allocation, were also significant (Table 5). Subsidies are generally used to provide essential goods at reduced prices to citizens. Hence, the surge in fiscal subsidies mainly reflects the impact of the growing needs of households and a noticeable increase in the costs of essential goods.

The government is deeply indebted. From 2011 to 2019, the fiscal deficit averaged about 12 percent of GDP (Figure 21.A). The deficit would be even higher if off-budget military expenditures and electricity subsidies were included. Due to a lack of access to domestic and international financing, the vast majority of the deficit has been financed by Central Bank borrowing, which has worsened inflation.

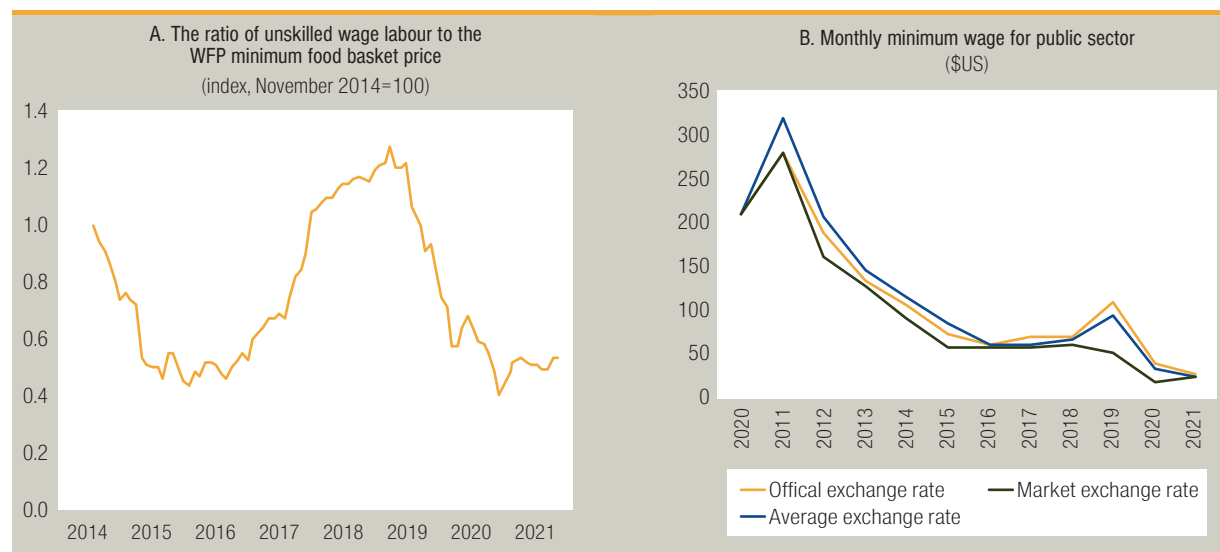
To rein in the subsidy bill, the authorities have, since 2021, increased the administrative price of essential products while tightening the rationing system. The authorities increased the subsidized price of essential food and fuel products

TABLE 5 • Subsidies by Items (Billion SYP)

	2017	2018	2019	2020	2021	2022
Subsidies for oil derivatives	177	275	430	11	2,700	2,700
Subsidies for food						
Subsidies for flour and yeast	398	357	361	337	700	2,400
Provisions for the agricultural support fund	10	10	10	10	50	50
Subsidies for sugar and rice	/	/	/	/	/	300
Subsidies for electricity (off-budget)	417	701	720	711	1800	3,600
Others						
Provisions for the social aid fund	15	15	10	15	50	50
Subsidies for the modern irrigation and the drought fund	/	/	/	/	/	29
Total budgeted subsidies	423	657	811	373	3,500	5,529
Total subsidies (including subsidies for electricity)	840	1,357	1,531	1,084	6,300	9,129
Memorandum items:						
Total budgeted expenditures	2,660	3,187	3,882	4,000	8,500	13,325
Total expenditures (including subsidies for electricity)	3,077	3,888	4,602	4,711	10,300	16,925

Source: World Bank estimates using various Syria Ministry of Finance (MOF) reports.

FIGURE 23 • Syria's Salary Levels



Source: Central Bureau of Statistics of Syria; Central Bank of Syria; WFP Syria Market Price Watch Bulletin; World Bank staff estimates.

to compensate for the depreciation of the currency, supply shortages, and the growing burden of subsidies. In addition, the authorities announced the exclusion of approximately 600,000 families out of four million from its subsidy program.³⁶ Among those removed from the eligibility pool were doctors and lawyers; several categories of merchants; owners of commercial, industrial, and tourist establishments; people owning multiple properties; and owners of cars manufactured after 2011. It was reported by the Minister of Telecommunication that about 380,000 families submitted requests claiming the government mistakenly excluded them from receiving subsidies, and about 70,000 families were reincluded in the subsidies system.³⁷

Higher costs of essential goods triggered by the war in Ukraine have forced fiscal policies to become more restrictive in Syria. Immediately after the start of the war, the Syrian government announced a restriction on public spending to cover only priorities over the next few months. Some construction projects have reportedly been suspended. Meanwhile, the authorities have rationed critical commodities to ensure they can be sustained for a longer period. More specifically, the Syrian government tightened the supply of essential food commodities, including wheat, sugar, rice, vegetable oil, and potatoes. In addition, new restrictions were imposed

on fuel allocations for public institutions and heating oil for families, cutting heating oil and gasoline allocations by half for every family.³⁸ Media reported that the authorities also considered raising public health care fees significantly and imposing public school registration fees.³⁹

Declining living standards and rising food insecurity

Inflation and currency depreciation have significantly eroded purchasing power, resulting in declining real wages. Despite repeated increases, workers' salaries have not kept up with inflation. The ratio between non-skilled labor wages⁴⁰ and the WFP minimum food basket price

³⁶ Daher, J., "Expelled from the Support System: Austerity Deepens in Syria," (Middle East Directions Programme, blog, February 15, 2022).

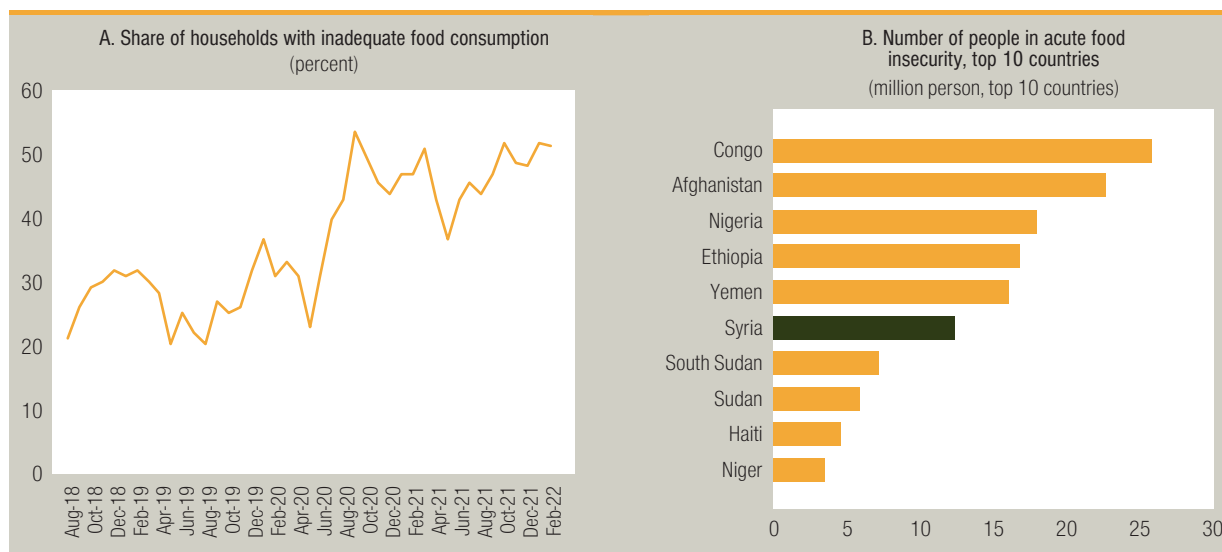
³⁷ See Syria Ministry of Communications; 70,154 objections were accepted.

³⁸ ETANA Syria, "Syria Brief - Economic Crisis - 8 March 2022."

³⁹ The Syria Report, "Government to Reduce Health and Education Subsidies, Media Says," (March 15, 2022).

⁴⁰ According to the WFP, non-skilled labor wages represent wages in construction and agriculture.

FIGURE 24 • Food Insecurity in Syria



Source: Syria mVAM Bulletin; WFP Hunger Hotspots: February to May 2022 Outlook; World Bank staff estimates.
 Note: Estimates of food insecurity across countries are based on information collected in January 2022.

has more than halved since 2019, meaning food is becoming increasingly costly to afford (Figure 23.A). At the end of 2021, the minimum wages for public sector workers amounted to only US\$ 24 per month (converted using the World Bank’s average exchange rate), equivalent to less than one-tenth of the pre-conflict levels (Figure 23.B).

Food insecurity has been rising due to the ongoing conflict, soaring food prices, diminished subsidies, low crop production, and the economic consequences of the war in Ukraine. Food insecurity was already severe prior to the war in Ukraine. WFP data show that more than half of households surveyed (52 percent) reported inadequate food consumption in February 2022, double the early 2019 share (Figure 24.A). Food insecurity was particularly prevalent among vulnerable groups. In February 2022, 58 percent of IDPs and 54 percent of returnees reported inadequate food consumption in October, compared to 47 percent of residents. In early 2022, the UN estimated that nearly 12 million people were severely food insecure, with an additional 1.8 million at risk of falling into food insecurity.⁴¹ As such, Syria ranked among the ten most food-insecure countries globally (Figure 24.B). Syria’s food insecurity has worsened further in the wake of the war in Ukraine. WFP estimated that the number of people who are

food insecure may have risen by another 10 percent after the war in Ukraine.⁴²

Food insecurity has prompted households to adopt negative coping strategies, resulting in a decline in household resilience. The continued erosion of purchasing power and unstable livelihood sources pushed many Syrian households to incur more debt. In February 2022, 72 percent of surveyed households in Syria reported having bought food on credit due to lack of food and/or money, according to the WFP Vulnerability Analysis and Mapping (VAM). In addition, according to the same VAM survey, relying on child labor as a coping strategy for the lack of food has become more prominent among Syrian households over time. Approximately 14 percent of surveyed households across Syria reported taking children who are of mandatory education age out of school to have them engage in income-generating activities and contribute to the household’s income.

⁴¹ The acute food insecure figure includes 1.9 million people living in camps and deemed to be 100 percent food insecure.

⁴² Chadwick, V., “WFP Says Syrians at ‘Breaking Point,’” (May 12, 2022).

OUTLOOK AND RISKS

Outlook

Economic conditions in Syria are projected to continue to be mired by prolonged armed conflict, turmoil in Lebanon and Turkey, COVID-19, and the war in Ukraine. Subject to extraordinarily high uncertainty, we project real GDP will drop by 2.6 percent in 2022 after contracting by 2.1 percent in 2021.⁴³ Private consumption will remain subdued, with a continued erosion of purchasing power amid rising prices and currency depreciation. Government spending, especially capital expenditures, will continue to be constrained by low revenues and the lack of access to financing. Private investment is projected to remain weak as the security situation is assumed to remain volatile and economic and policy uncertainties persist (Table 6: Macro outlook indicators).

Syria's current account will remain firmly in deficit. Although Syria's bilateral relations with its Arab neighbors are improving, export earnings will likely remain low owing to sanctions-related restrictions and the recently announced export ban on agricultural products to meet domestic demand. Import bills are

expected to increase, due to higher global commodity prices of essential food and fuel products, especially after the war in Ukraine. Consequently, the trade deficit will remain extremely high, at around 20 percent of GDP in 2022. The persistent trade deficit will be partly offset by net current transfer inflows. However, growth in remittances to Syria is forecast to moderate in the short run, mainly due to a weaker growth outlook for Syria's major refugee-hosting countries. In particular, the deepening economic crisis in Lebanon and Turkey may lead to a decline in remittance flows into Syria. Overall, the current account deficit is projected to increase from around 4 percent of GDP in 2021 to 5 percent of GDP in 2022.

The fiscal deficit is expected to widen further in 2022. For Syria, it is estimated that

⁴³ We first apply a VAR model to predict GDP in 2022 without the shock of the war in Ukraine, using the pre-conflict estimate of the elasticity between NTLs and GDP described in Box 1. We then quantify the relationship between NTLs and WFP minimum food prices and analyzes the impact of the additional food price growth triggered by the war in Ukraine on NTLs and, consequently, GDP.

TABLE 6 • Macro Outlook Indicators
(Annual percent changes unless indicated otherwise)

	2016	2017	2018	2019	2020	2021e	2022f
Real GDP growth, at constant prices	-5.6	-0.7	1.5	3.7	1.3	-2.1	-2.6
Inflation (Consumer Price Index)	47.7	18.0	1.0	13.4	114.2	89.6	50.9
Fiscal balance (% of GDP)	-10.2	-8.9	-8.3	-7.9	-6.5	-6.8	-7.7
Current account balance (% of GDP)	-5.2	-3.0	-1.0	-4.0	-3.0	-4.0	-5.0

Source: World Bank estimates.

Notes: e = estimate, f = forecast.

approximately 45 percent of budgeted expenditures are related to food and energy. As such, higher commodity prices, triggered by the war in Ukraine, will raise fiscal spending significantly. Efforts by the authorities to tighten fiscal policy are projected to partially, but not fully, offset the cost-driven increase in expenditures. Meanwhile, fiscal revenues are forecast to decline in 2022 due to reduced earnings from state entities and potential tax cuts in a weakening economy. Put together, we forecast the fiscal deficit will widen from 6.8 percent in 2021 to 7.7 percent of GDP in 2022.⁴⁴

Persistent twin deficits would further drain foreign exchange reserves, leading to a further depreciation of the local currency. The depreciation trend of the Syrian pound may continue in 2022, driven by dwindling US dollar liquidity, a spillover effect from the financial crisis in Lebanon and Turkey, and the government's excessive monetization of its deficit. In addition, further depletion of the foreign exchange reserves may trigger a downward spiral of devaluation and price rises.

Inflation is projected to remain elevated in the short term, due to the pass-through effects of currency depreciation, persistent food and fuel shortages, and reduced food and fuel rationing. Poor harvests are likely to persist in 2022, due to reduced sowing of cereal crops in late 2021, limited financial resources for purchasing agricultural inputs, and decreased availability of irrigation water.⁴⁵ As Syria increasingly relies on imports to meet its food and oil consumption,⁴⁶ the surge in global food and oil prices triggered by the war in Ukraine will cause domestic consumer prices to rise. Using trends from the first four months of 2022, we forecast an 83 percent yoy

increase in the WFP minimum food basket price in 2022. Assuming the historical relationship between the WFP food basket price and food inflation remain stable—as well as stability between food inflation and overall inflation—we project CPI in Syria will reach 51 percent yoy in 2022, down from 90 percent yoy in 2021.⁴⁷

A further rise in food prices will stress the already struggling poor. The evolving rise in food prices and the higher risk of food insecurity are likely to hurt poor families the most, because they spend a larger percentage share of their expenditure on food and energy. In addition, rising food prices will cause fiscal balances to deteriorate. Pressure on fiscal balances likely will force governments to reduce food subsidies further, increasing the vulnerability of the poor and adding to already elevated levels of food insecurity.

⁴⁴ The projections are based on the official 2022 budget figures.

⁴⁵ The drought situation has been exacerbated by a reduction in water from the Euphrates River arriving in Syria from Turkey.

⁴⁶ Prior to 2011, Syria had been self-sufficient in food production. In recent years, more than half of the food supply comes from imports to Syria, according to the WFP data. As domestic food production of Syria collapsed in 2021, food imports accounted for about two-thirds of food supply that year.

⁴⁷ The annual CPI is estimated to increase by 90 percent yoy in 2021 and 51 percent yoy in 2022, respectively, if: (1) the relationship between the WFP minimum food basket price and food inflation for 2020, as well as the relationship between food inflation and overall inflation over the same year, remains, and (2) WFP minimum food basket price growth of 144 percent yoy in 2021 and projected growth of 83 percent yoy in 2022.

Risks

Risks to the growth outlook are significant and tilted to the downside. Two major sources of uncertainty are the COVID-19 pandemic and the war in Ukraine.

Renewed outbreaks of COVID-19 remain a major risk, particularly for Syria, given its limited COVID-19 surveillance. Syria has experienced two major COVID-19 waves, in September/ October 2021 and February 2022, when the Delta and Omicron variants hit the country. The number of cases started to decrease after March 2022. However, the high cumulative case fatality rate (5.8 percent) indicates the inability of the health system to cope with providing care to COVID-19 patients. COVID-19-associated deaths are relatively high in Syria, partially due to a slow vaccine rollout. As of May 14, 2022, only 9.1 percent of Syrians were fully vaccinated, and another 5.2 percent were partially vaccinated. In the event of a rapid spread of more transmissible and deadly COVID-19 variants in Syria, slow vaccination rollouts and inadequate health facilities would exacerbate its impact (Box 4).

Owing to its heavy reliance on imports, Syria is particularly vulnerable to disruptions in the commodity market and the associated trade-policy interventions triggered by the Russia-Ukraine war. Syria is heavily dependent on wheat imports from Russia. In 2021, the Syrian government imported 1.5 million tonnes of wheat, mostly from Russia. Media reported that the Syrian government had reached an agreement with Russia at the end of 2021 to import another 1 million tons of wheat from Russia.⁴⁸ With the war in Ukraine, it is uncertain whether the agreement will be enforced. Syria may face additional obstacles to food imports as a result of the trade-policy interventions triggered by the war in Ukraine. Since the beginning of the war, more than 30 new export restrictions have been announced worldwide. India, the second-largest wheat producer, banned exports amid food supply concerns in May 2022. Export restrictions alone were estimated to have added 7 percentage points to the price of wheat and risk igniting a tit-for-tat escalation that could trigger a food crisis, potentially negatively affecting Syria as a net food importer.⁴⁹

As a result of the war in Ukraine, donors may divert some humanitarian assistance away from Syria and the Syrian war-affected refugees.

Despite growing needs, reported humanitarian donor funding for Syria in 2021 reached its lowest level since 2014, according to the data collected by the UN Financial Tracking Service (FTS). Humanitarian assistance will be needed to cushion the blow from surging commodity prices triggered by the war in Ukraine, particularly for Syria, which is facing acute food insecurity. Yet, with the global economy under significant strain and donor governments facing increasing domestic costs, global aid may decline further. In addition, some aid may shift away from Syria and the Syrian war-affected refugees, as donors prioritize funding for Ukrainian refugees. After several cuts in 2021, the WFP announced that it would further scale down a number of items in its monthly emergency food baskets to Northwest Syria in May 2022, a move attributed to funding constraints and rising global food prices.⁵⁰ Some EUR 6.4 billion was pledged toward funding the international humanitarian aid effort in Syria during the 2022 Brussels Conference, held on May 10, 2022. Despite registering an increase over the previous year, pledges made by donor countries continued to fall short of the EUR 9.31 billion funding requirements made by UN agencies and other NGOs.⁵¹

The ongoing war in Ukraine has geopolitical implications that may threaten the delivery of humanitarian assistance to Syria. The existing UN cross-border mechanism that permits the provision of aid into Idlib (a non-government-controlled area) is up for a renewal vote in July 2022. If negotiations among stakeholders fail, there is a risk that the last UN humanitarian corridor into Syria, which is vital to delivering life-saving aid to 2.4 million people in Northwest Syria, could be forced to close. In general, since the war in Ukraine, a constructive diplomatic

⁴⁸ North Press Agency, "Syria to import one million tons of wheat from Russia," (December 6, 2021).

⁴⁹ Ruta, M., "The Impact of the War in Ukraine on Global Trade and Investment," World Bank, April 25, 2022).

⁵⁰ Middle East Monitor, "WFP Reduces Monthly Aid to NW Syria, Amid Worsening Food Crisis," (April 17, 2022).

⁵¹ The Syrian Report, "Brussels Conference Pledges Unexpectedly Rise to EUR 4.1 Billion," (May 11, 2022).

BOX 4: COVID-19 CONTINUES TO THREATEN SYRIA'S HEALTH SYSTEM

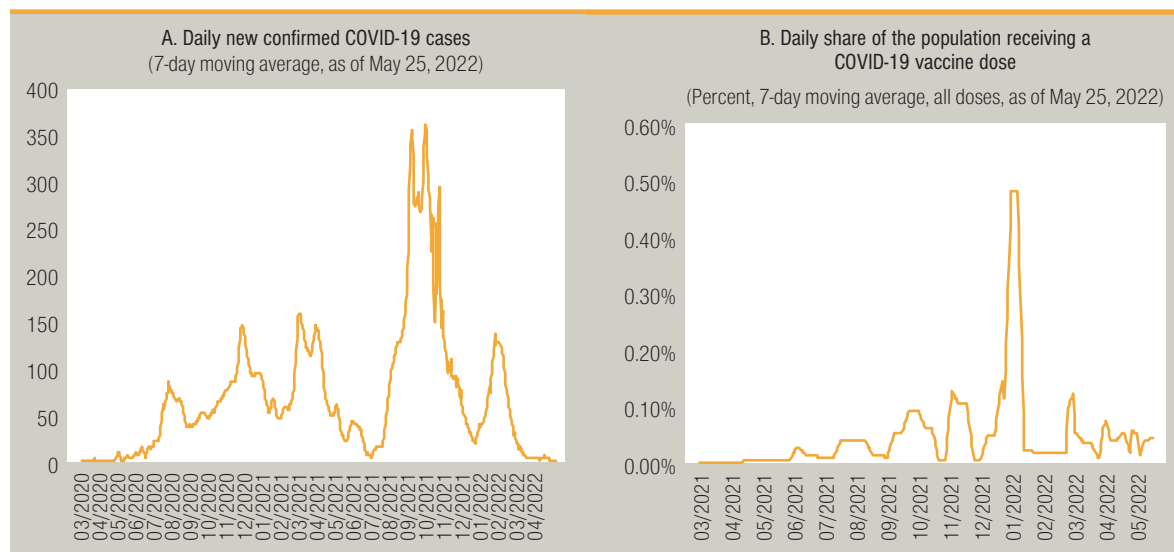
Prior to the conflict, Syria's health outcomes were comparable to other countries in the region. In 2011, Syria's infant mortality rate of 16.7 per 1,000 live births was lower than the MENA regional average (23.7 per 1000 live births).^a The health system consisted of a mix of government-run hospitals and primary care facilities, with advanced medical care concentrated in major cities such as Damascus and Aleppo.^b The number of hospital beds per 1,000 persons in 2011 was 1.6, compared to 1.3 for Iraq, 1.7 for Iran, 3.5 for Lebanon, and 1.8 for Jordan.^c The health financing data from 2012^d showed gaps in health financing, with decreased levels of public spending on health as compared to previous years (domestic general government health expenditure amounted to 1.6 percent of GDP). At the same time, households faced a high burden of health expenditure with out-of-pocket spending constituting 53.7 percent of current health expenditure.

The conflict devastated the health system, which only partially recovered as hostilities slowed. More than 50 percent of the health infrastructure is estimated to have been damaged or destroyed by the conflict.^e In addition to destruction of hospital buildings and equipment, water, electricity, medicines, and consumables have become scarce.^f Recent reports show that even among undamaged or rehabilitated facilities, many are not operating or providing only limited services; 44 percent of primary health centers and 34 percent of hospitals are either not functioning or partially functioning.^g The conflict has had widely heterogeneous impacts across the country, and in particular across areas controlled by different actors. In December 2021, 12 percent of public health centers were not functioning in southern Syria, compared to 52 percent in northwest Syria and 55 percent in northeast Syria.^h Closures of border crossings in 2020 has interfered with humanitarian delivery of medical supplies, especially in northeast and northwest Syria.ⁱ These challenges health care were exacerbated by a mass exodus of health workers, who fled routine attacks against providers.^j As a result, health outcomes deteriorated sharply, although the limited available data suggests that some key outcomes had begun to make a recovery by the eve of the COVID-19 pandemic.

The COVID-19 pandemic further exacerbated the strain on the health sector. In September/ October 2021 and February 2022, new waves of COVID-19 brought daily infections and deaths to their highest level on record. As shown in Figure 25.A, the number of cases started to decrease since March 2022. However, the high cumulative case fatality rate (5.8 percent)^k points toward the inability of the health system to cope with the needs for providing care for COVID-19 patients. Urban health facilities have struggled to serve all COVID-19 patients and sometimes suspended non-emergency surgeries.^l Some services, such as childhood vaccination coverage, have not changed significantly between 2020 and 2021, although it is not clear whether this reflects the absence of an effect of COVID-19 on some routine services or is the result of other confounding factors.^m

The extremely slow vaccine rollout puts Syria at a high risk of future waves. As of May 9, 2022, only 8.4 percent of Syrians were fully vaccinated and another 5.6 percent partially vaccinated.ⁿ A recent report by the COVID-19 Vaccine Delivery Partnership (CoVDP)^o highlighted Syria as one of the 34 countries with less than 10 percent coverage and persistently low vaccination rates. While availability of vaccines has improved significantly at the global level, Syria will need a sustained and predictable supply to allow effective planning of vaccination strategies and campaigns. Falling demand for COVID-19 vaccinations also remains a major concern. As shown in Figure 25.B, after a brief uptick in vaccine uptake at the end of 2021, currently the number of daily doses delivered is less than 0.1 percent of the population. Based on progress

FIGURE 25 • COVID-19 in Syria



Source: Our World in Data; World Bank World Bank staff estimates.

(continued on next page)

BOX 4: COVID-19 CONTINUES TO THREATEN SYRIA'S HEALTH SYSTEM *(continued)*

so far, Syria is projected to reach 70 percent vaccination coverage only by February 2026.⁹ The low vaccination coverage represents a serious threat to economic recovery, especially with the risk of new variants. With low levels of immunity, new waves of cases could lead to spikes in severe disease and death, which would quickly overwhelm the fragile health system. Syria requires a focused strategy to restore health and health services along with urgent efforts to scale up COVID-19 vaccination coverage. Additionally, accelerating the delivery of other COVID-19 tools and treatments is a crucial priority to help build up multiple layers of protection against the COVID-19 virus.

^a World Bank, "World Development Indicators, Infant Mortality Rate for the Syrian Arab Republic," (May 5, 2022).

^b Sharara, S. L. and Kan, S. S., "War and Infectious Diseases: Challenges of the Syrian Civil War." (2014).

^c World Bank Open Data, Physicians (per 1,000 people), <https://data.worldbank.org/indicator/SH.MED.PHYS.ZS>.

^d World Bank, World Development Indicators, (2022). Accessed February 22, 2022. World Development Indicators | DataBank (worldbank.org)

^e Devi S., "Health in Syria: A Decade of Conflict," (The Lancet, March 13, 2021).

^f Abbara et al., "The Effect of the Conflict on Syria's Health System and Human Resources For Health," (World Health & Population, 2015).

^g World Health Organization, "WHO Summary of Key Indicators – Whole of Syria Dashboard," Accessed February 10, 2022.

^h World Health Organization, Syria, "Summary of Key Performance Indicators," (2022). Accessed February 16, 2022.

ⁱ United Nations Office for the Coordination of Humanitarian Affairs (OCHA), "Humanitarian Needs Overview: Syrian Arab Republic." (2021).

^j Fouad, et al., "Health Workers and the Weaponisation of Health Care in Syria: A Preliminary Inquiry for the Lancet–American University of Beirut Commission on Syria," (The Lancet, 2017).

^k World Health Organization, "Syria, COVID-19 Dashboard, 2022." Accessed May 5, 2022.

^l OCHA (2021).

^m WHO (Whole of Syria Dashboard), 2022.

ⁿ World Bank, "Coronavirus Pandemic (COVID-19)," (Our World In Data, database).

^o World Health Organization and World Bank, "Accelerating COVID-19 Vaccine Deployment (2022)."

^p World Bank, "COVID-19 Vaccine Deployment Tracker."

environment necessary for advancing reforms for Syria has become more challenging.


Economic stagnation and deterioration of public services may lead to increased social unrest. The removal of subsidy programs amid high food prices already triggered protests in government-controlled areas such as Tartus and Latakia, as well as in Northwest Syria in early 2022.⁵² Existing evidence suggests that rising food inflation in an environment of fragile political stability, and inadequate resources to maintain subsidies, may lead to a significant increase in social unrest (Arezki and Bruckner, 2014; Bellemare, 2015).

There are upside risks to the outlook. Syria's improved trade relations with its Arab neighbors could reduce its economic isolation. In addition, non-governmental organizations were allowed to carry out additional transactions and activities, and restrictions on foreign investments in non-regime held areas of Northeast and Northwest Syria were also eased recently.⁵³ These measures could potentially facilitate

trade, investment, and humanitarian operations in Syria. Nevertheless, given Syria's worsening economic conditions, trade and investment are unlikely to pick up dramatically in the short term, as the private sector may continue to pursue de-risking strategies.

⁵² The Syria Report, "Government removes millions from subsidy programme, triggering rare protests," (February 8, 2022). See also al-Aswad, H. (2022), "Syria: protests mount amid anger over 'unfair' cuts to government subsidies," (Middle East Eye, February 12, 2022).

⁵³ On November 24, 2021, the US Treasury Department amended a general license for non-governmental organizations to allow them to engage in additional transactions and activities in support of non-profit activities in Syria, including new investment, the purchase of refined petroleum products of Syrian origin for use in Syria, and certain transactions with parts of the Syrian government. In May 2022, the Treasury announced the authorization of activities in certain economic sectors in the non-regime-held areas of Northeast and Northwest Syria.



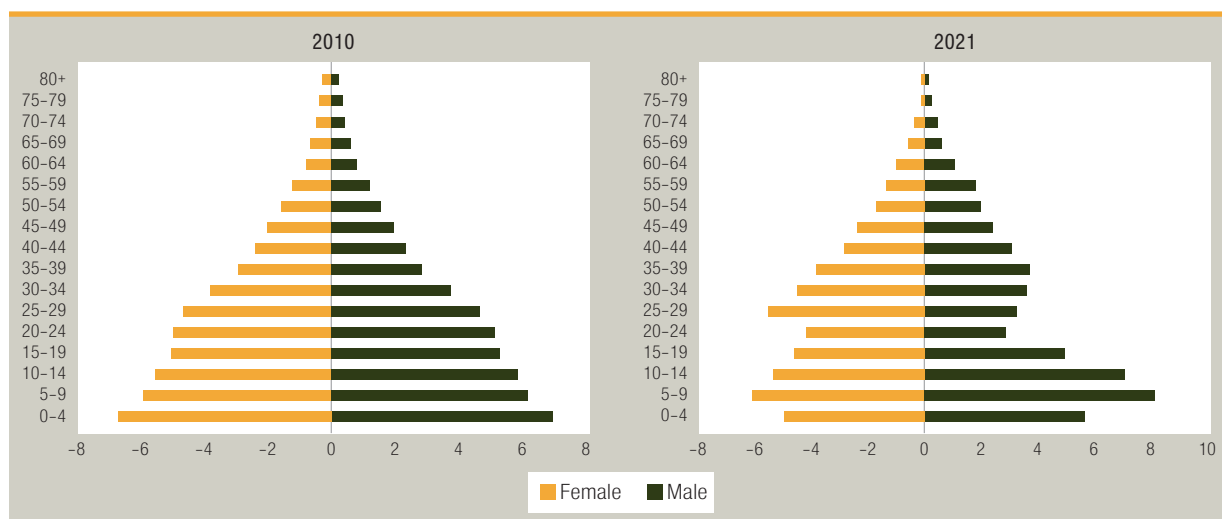
SPECIAL FOCUS: DEMOGRAPHIC AND LABOR MARKET CONSEQUENCES OF THE SYRIAN CONFLICT

The current demographic profile of the Syrian population provides a good illustration of the massive human impact of the conflict. After about a decade of war, the demographic profile of the Syrian population has dramatically changed, with the male deficit in prime-age adult population being its most prominent feature. The decline in the male working age population, together with the progressive deterioration of economic conditions in the country, has pushed more Syrian women to enter the labor market to help support their families. However, Syrian women continue to face severe challenges in terms of unemployment and lack economic opportunities compared to their male counterparts. These challenges have been further exacerbated as a result of conflict.

Conflicts can have profound impacts on the demographic structure of populations, with potential long-lasting implications. The developmental consequences of conflict are immense, both in terms of human suffering and social and economic

costs. The demographic profile of a country affected by war can be a good indicator of the scale of human losses brought about by conflict. Epidemiologists distinguish between direct and indirect effects of conflict. Direct effects include higher mortality associated with war-related casualties and international displacement leading to substantial losses in population. Indirect effects can be even larger. Massive destruction brought about by conflict over time impacts services, infrastructure, and productive systems that are critical for people's survival, leading to increases in malnutrition, morbidity and, ultimately, to higher mortality. Destruction of health facilities, collapse of health systems, damage to agriculture production and food systems, as well as destruction of houses and water and sanitation infrastructure are among the most harmful effects of conflicts, with implications often enduring well beyond the termination of hostilities. Assessing direct and indirect demographic effects of conflict is complicated by the lack of data that characterizes conflict-affected countries. In fact, information

FIGURE 26 • Syria Population Pyramid, 2010 and 2021
(Million people, by age group)

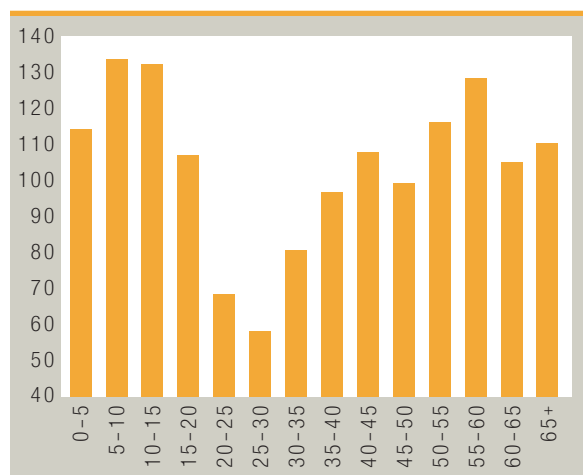


Source: World Bank calculations based on UN Department of Economic and Social Affairs (DESA); World Population Prospects 2010; and HNAP household survey data (Summer 2021).

from civil registration systems is often time lacking or unreliable in times of conflict, and it is typically compounded by the limited availability of representative household surveys. Despite these challenges, the analysis of changes in the demographic structure of a population can provide important insights into the welfare and long-term development challenges of a country in conflict.

The current demographic profile of the Syrian population embodies the massive human impact of the conflict. The demographic structure of the Syrian population has been severely affected by conflict. As shown in Figure 26, Syria's population structure in 2021—as estimated using the Humanitarian Needs Assessment Programme (HNAP) household survey data collected in May-June 2021⁵⁴—is significantly different from the one observed in 2010, before the onset of conflict. In 2010, the gender composition of Syria's population was relatively balanced across age groups, and children in the 0–4 age category were the largest demographic group, in line with the profile of a growing population. These features have not persisted after more than a decade of conflict. The demographic structure of Syria in 2021 is one typical of a conflict-stricken country. Similar to other countries affected by conflict,⁵⁵ the current shape of Syria's population pyramid clearly shows a substantial male deficit concentrated in people ages 20 to 40 (Figure 27).

FIGURE 27 • Masculinity Ratio in 2021, by Age Group
(Number of males per 100 females, by age group)

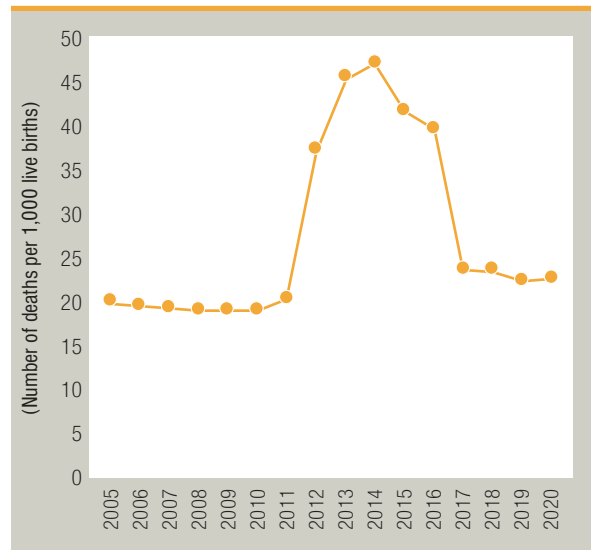


Source: World Bank calculations based on HNAP household survey data (Summer 2021).

⁵⁴ From mid-May to mid-June 2021, HNAP conducted a nationwide demographic household survey across all 14 governorates of Syria. The survey, with a total sample of 24,573 households, collected data on key demographic and socio-economic indicators, and it is representative at the country, governorate, and sub-district level.

⁵⁵ Demographic deficits of prime-age men have been, for example, documented in Rwanda, Cambodia, and Darfur (Guha-Sapir and D'Aoust, 2011).

FIGURE 28 • Trends in under-Five Mortality Rate (Number of deaths per 1,000 live births)

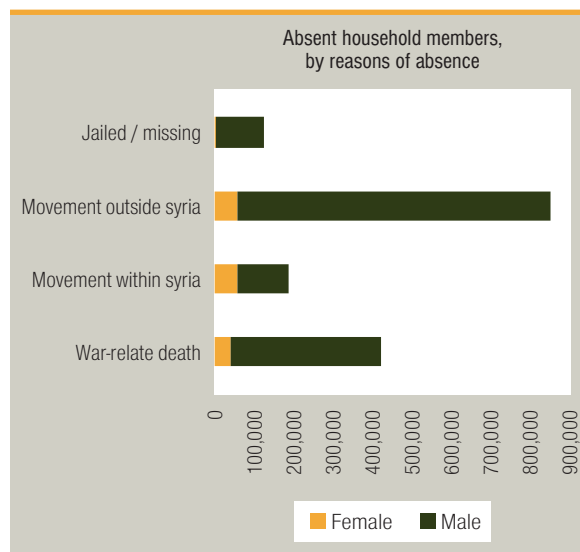


Source: UNICEF, <https://data.unicef.org/country/syr/>.

Moreover, compared to its pre-conflict level, estimates indicate a decline in the share of children in the 0–4 age category, consistent with evidence indicating an increase mortality rate related to conflict for children under age 5 (Figure 28). A compounding driver for this change might be a decline in fertility, spurred by the progressive deterioration of living conditions and high levels of maternal mortality.⁵⁶ Overall, despite these changes, the demographic dependency rate has remained stable at its pre-conflict level.

International displacement and war-related deaths have been the two main driving forces behind observed gender imbalances in Syria’s prime-age adult population. Understanding the causes of observed age-sex deficits can provide important insights on household welfare and useful information for policy action.⁵⁷ Data for Syria indicate that both war-related deaths and displacement might have substantially contributed to the gender imbalances currently observed in the population. Overall, close to one third of householders currently living in Syria report at least one “absent household member” in relation to the conflict. As shown in Figure 29, “absent” household members in 2021 were predominantly males who either left Syria or died because

FIGURE 29 • Number of Absent Members for Households Currently Residing in Syria, by Reason of Absence (Number of individuals, by reason for absence)



Source: World Bank calculations based on HNAP household survey data (Summer 2021).

of conflict: approximately 850,000 individuals—93 percent of whom are men—have fled Syria and left their households behind, while another 420,000 individuals—90 percent of whom are men—have died as a direct consequence of the war.⁵⁸ These estimates are based on reports of household members currently living in Syria and should therefore not be interpreted as indicative of the total displacement or death toll of the Syrian conflict. Entire households have been displaced as a result of conflict; some of these internationally displaced households might have suffered

⁵⁶ In low-income countries, conflict has been correlated with increases in maternal mortality due to the decline in access to reproductive health services and female education, as well as social insecurity (Urdal and Che, 2013).

⁵⁷ Male deficits due to conflict-related deaths may result in an increase of vulnerable groups such as women- or child-headed households. On the other hand, welfare impacts related to gender imbalances brought about by international displacement or migration could be mitigated through remittances flows.

⁵⁸ More than 50 percent of war-related deaths are concentrated in five governorates: Deir-ez-Zor, Rural Damascus, Aleppo, Idlib and Homs.

FIGURE 30 • Changes in Working Age Population, 2010-2021 (Million people)

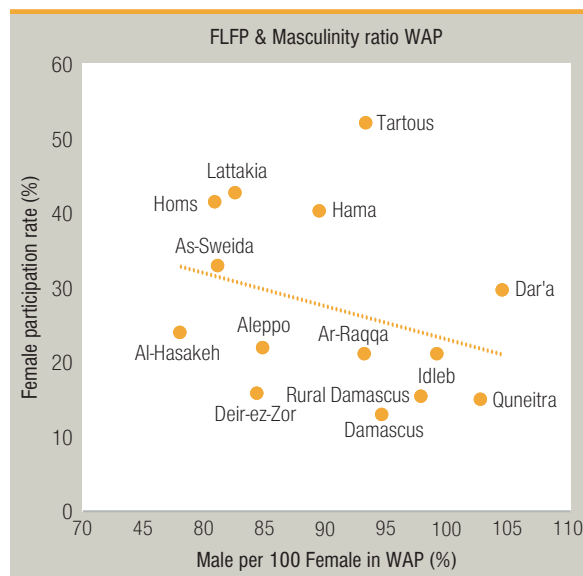


Source: World Bank calculations based on Labor Force Survey 2010 and HNAP household survey data (Summer 2021).

casualties, and entire households might have lost their lives due to conflict.^{59,60} Still, these estimates provide important insights into the scale of the welfare challenges that Syrian households face to sustain their livelihoods in a dramatically deteriorating economic environment. In addition, the estimates shed light on the critical role that interventions aimed at sustaining international remittances (through economic integration of Syrian refugees in host countries) could play for the livelihoods of households in Syria. In 2021, according to OCHA data, 8.8 percent of households in Syria were female-headed, up from 4.4 percent in 2009; at the same time, close to one in four Syrian households receive international remittances and, critically, relied on them for livelihood.

The demographic impact of conflict coupled with deteriorating economic conditions in the country have important implications for the Syrian labor market. Compared to its pre-conflict levels, Syria's working age population has significantly shrunk, particularly in its male component (Figure 30). However, the impact of this demographic shock has been compensated by an increase in labor force participation, leaving the overall number of employed Syrians almost unchanged at around 5.2 million.⁶¹ The

FIGURE 31 • Relation between Female Labor Force Participation and Masculinity Ratio at the Governorate Level, 2021 (Percent)



increase in the level of economic activity has been particularly dramatic for Syrian women, with female labor force participation doubling from 13 percent in

⁵⁹ The Syrian conflict has originated one of the largest episodes of international displacement since World War II. According to latest UNHCR data, 5.7 million Syrian refugees are currently hosted in neighboring countries and an additional 1 million reside in Europe, mostly in Germany and Sweden. As of April 30, 3.76 million Syrian refugees are living in Turkey, 839,000 in Lebanon, 674,000 in Jordan, 258,000 in Iraq, and 141,000 in Egypt. See <https://data2.unhcr.org/en/situations/syria>.

⁶⁰ Estimates of the total death toll of the Syrian war vary depending on the methodology and reporting agency. In 2021, the UN's human rights office (OHCHR) released a tally of 350,200 deaths, including both civilians and combatants. The count is based on a strict methodology requiring the deceased's full name, date of death, and location of the body, and should therefore be interpreted as an under-estimation of the actual number of war-related deaths. The Syrian Observatory for Human Rights (SOHR) estimates an overall death toll of 610,000 people over 11 years of conflict, of which 160,681 were civilians (120,158 men, 15,237 women, and 25,286 children).

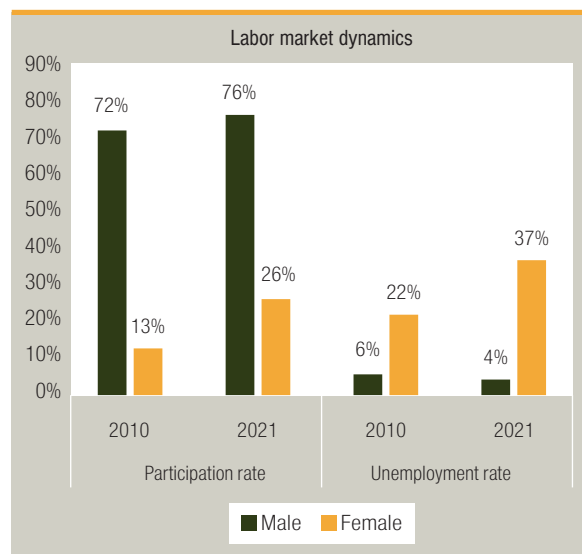
⁶¹ Between 2010 and 2021, labor force participation in Syria increased from 43 percent to 50 percent.

2010 to 26 percent in 2021, against a more modest increase in male participation from 72 to 76 percent over the same period. With deteriorating economic conditions in the country, more Syrian women have been pushed to enter the labor market to support their households in order to make ends meet and, possibly, to compensate for the absence of male adult household members. In fact, as shown in Figure 31, the increase in female labor force participation has been particularly strong in governorates more affected by the conflict-induced male demographic deficits, possibly suggesting the substituting role that women are playing in the Syrian labor market.⁶²

Poor labor market opportunities add to the challenges that Syrian women are facing as a result of the conflict. In a region characterized by low levels of female labor force participation, the observed increase in economic activity among Syrian women cannot be welcomed as an unequivocally positive development. In fact, while an increasing number of women are pushed to seek employment to help support their families, they face more severe labor market challenges compared to their male counterparts. The female unemployment rate in 2021 stood as high as 37 percent, 33 percentage points higher than male unemployment and 15 percentage points higher than its pre-conflict level (Figure 32). Moreover, the massive destruction of physical capital and productive capacity of Syria's agriculture and industry sectors have had a disproportionate impact on female employment opportunities. Of the 55,000 jobs lost in agriculture, two in three were held by women. In the manufacturing sector, the decline in female employment was 82 percent, against a 34 percent drop in male employment. As a result, women's employment options are currently mostly restricted to the service sector. In 2021, the service sector represented 87 percent of female employment compared to 69 percent in 2010.

Despite the observed increase in labor force participation, other factors associated with the conflict have limited women's opportunities for socio-economic inclusion. Similar to other countries in the region, gender norms and legal barriers limit Syrian women's engagement in the public sphere. Conflict has further exacerbated

FIGURE 32 • Trends in Labor Force Participation and Unemployment Rates, by Gender



Source: World Bank calculations based on Labor Force Survey 2010 and HNAP household survey data (Summer 2021).

these constraints. Lack of access to government-issued civil documentation, particularly in areas more affected by conflict, represents a major challenge for women, particularly for widowed and divorced ones, as it limits their ability to inherit property, their assets' tenure security, and possibly exposes them to the risk of violence. Moreover, safety and security concerns have heightened as a result of conflict, further limiting the physical mobility and employment opportunities of Syrian women and adding additional risks for those entering the labor market by force of necessity.⁶³

Demographic and labor market changes brought about by the conflict can have structural

⁶² A similar positive relation between conflict and female labor force participation, oftentimes referred to as the "additional worker effect," has been found in other conflict episodes such as those in Peru, Nepal, and Vietnam. See Gallegos (2012); Menon and van der Meulen Rodgers (2015); and Kreibaum and Klasen (2015).

⁶³ According to most recent reports, the prevalence of gender-based violence (GBV) remains a prominent concern, with one in five households indicating that women and girls feel unsafe in their respective locations, mainly when crossing checkpoints, at markets, and on public transportation. See OCHA, "2022 Humanitarian Needs Overview: Syrian Arab Republic," (February 2022).

implications for Syria's future growth prospects.

More than a decade of conflict has caused massive losses in Syria's human and physical capital, with destruction of vital assets and infrastructure. Losses in human capital stem from both changes in the size and demographic structure of Syria's resident population as well as from the decline in its productivity.⁶⁴ Long-term implications of these losses can be far reaching. A critical factor that might positively influence future prospects, besides the expected peace-dividend from

the cessation of hostilities and progressive reintegration of displaced populations, is the improvement of socio-economic inclusion of Syrian women.

⁶⁴ Decline in current and future productivity can be expected as a result of physical and psychological trauma, increased malnutrition, and lower investments in children's education, due to both supply and demand constraints.



TECHNICAL APPENDIX

Counterfactual GDP Calculations for Syria

Using the approach pioneered by Abadie and Gardeazabal (2003), popularly known as the synthetic control method (SCM), this note estimates a counterfactual GDP for Syria. The approach avoids the arbitrariness of the selection of the control group by identifying a combination of comparator countries that best approximate the characteristics of the studied country. This combination of comparator countries is likely to produce a better control/comparison group for the country exposed to the shock than any simple comparison alone.

Specification and data

The outcome of interest is real GDP. Annual real GDP in constant 2015 US dollars for Syria was obtained from the World Bank's World Development Indicators (WDI). The vector of predictors that was selected to explain GDP included employment (employers per hundred persons), trade openness (trade as percentage of GDP), industry shares (agriculture

and industry as a percentage of GDP), investment share (gross capital formation as a percentage of GDP), physical capital (capital stock per capita), human capital (human capital index), and political status (democracy index). For a full description of the variables used in this analysis, please refer to Appendix 1.

The selection of the explanatory variables reflects a common specification for cross-country growth simulations (Abadie and Gardeazabal, 2003; Abadie et al., 2015; Adhikari et al. 2016; Campos et al., 2019). 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. The data relied on a cross-country panel data set for the period between 1995 and 2019. The data of employment and investment came from Penn World Table 10.0 database. The data of democracy proxy came from the Polity Project initiated by Center of Systemic Peace. And all other variables supporting the calculation of the synthetic counterfactuals came from the World Bank's World Development Indicators Database.

Before conducting the SCM to construct Syria's macroeconomic counterfactual scenario, we needed to ensure that none of the comparators that were selected violated the exogeneity criterion. Accordingly, we compiled a donor pool of all countries in the world excluding those that were involved in or significantly impacted by the conflict or other significant shocks during the period of analysis. For example, the study dropped those Middle East and North Africa (MENA) countries affected by the Arab Spring, and Japan, which was affected by the Fukushima disaster of 2011. For a complete list of all the countries dropped from the dataset, please refer to Appendix 2.

The algorithm of SCM requires having countries with complete data for all years in the outcome variable and, in case of the covariates, at least one year of data for the pre-intervention period. Hence, countries without both specifications have been dropped from the sample.

Overview of the synthetic control method

To investigate what would have been the real GDP level in Syria if the Syrian civil war had not occurred, we use the synthetic control method developed by Abadie and Gardeazabal (2003) and extended in Abadie et al. (2010, 2015).

This method searches for a weighted combination of other countries (donors) that resemble as closely as possible the characteristics of the target country in the pretreatment period in terms of an outcome variable (real GDP, in this case), and a set of other specific covariates. This is achieved by minimizing for the pretreatment period the root mean squared prediction error (RMSPE).

To describe it more formally, let's use the notation described by Abadie et al. (2010). Let's assume that Y_{it} is the outcome variable of interest (GDP level) of a country i at a time t . $i = 1$ represents the country affected by the event, and $i = 2, \dots, N = 1$ those who were not impacted. $t = 1, \dots, T_0, \dots, T$, being T_0 the year the event of interest occurred.

Let's assume also that Y_{it}^I is the outcome variable of interest of the country affected by the event and Y_{it}^N the outcome variable of interest of the country had the event never occurred.⁶⁵ The average treatment effect estimator can be represented as:

$$\tau_{it} = Y_{it}^I - Y_{it}^N \quad (1)$$

Since we cannot observe the outcome variable of the treated country had the treatment never occurred (when $\tau_{T_0+1}, \dots, \tau_{iT}$), to estimate the treated country's hypothetical outcome τ_{iT} (we rely on the general model proposed by Abadie et al. (2010):

$$Y_{it}^I = \delta_t + \tau_{it} + \nu_{it} \quad (2)$$

$$\tau_{it} = \alpha_{it} D_{it} \quad (3)$$

$$Y_{it}^N = \delta_t + \nu_{it} \quad (4)$$

$$\nu_{it} = \theta_t Z_i + \lambda_t \omega_t + \varepsilon_{it} \quad (5)$$

Where D_{it} is a binary indicator adopting the value of 1 when $i = 1$ and $t > T_0$ and zero otherwise; α_{it} is the effect of the event on the variable of interest; Z_i is a vector of country-level covariates; θ_t is a vector of time-specific parameters; λ_t a vector of unobserved common factors; ω_t the country-specific observable term; and ε_{it} the unobserved transitory shocks with zero mean.

The counterfactual will be given by an estimate of Y_{it} (when $i > 1$) as close as possible to Y_{1t} for every $t < T_0$, based on the previously defined country-level covariates (Z_i). A series of weights ($W = w_2, \dots, w_{N+1}$) will be assigned to construct the counterfactuals, where $\sum_{i=2}^{N+1} w_i = 1$ and $w_i \geq 0$. Therefore:

$$\sum_{i=2}^{N+1} w_i Y_{it} = Y_{1t} \quad (6)$$

and

$$\sum_{i=2}^{N+1} w_i Z_i = Z_1 \quad (7)$$

lead to the unbiased estimator of τ_{it} :

$$\hat{\tau}_{it} = Y_{it} - \sum_{i=2}^{N+1} w_i Y_{it} \quad (8)$$

⁶⁵ In order to implement a synthetic control model, we need to assume that the event does not have any impacts on the outcome variable of the treated country before $t = T_0$

The optimal set of weights is chosen to minimize the root mean squared prediction error, which is given by:

$$RMSPE = \sqrt{\frac{1}{T_0} \sum_{t=1}^{T_0} (Y_t - \sum_{i=2}^{N+1} w_i Y_{it})^2} \quad (9)$$

Results

The study conducted the SCM estimation using all pre-treatment outcome values as predictors. The synthetic Syria is made of nine countries, with the weights in the parentheses: Togo (0.441), Gabon (0.194), Uruguay (0.175), Trinidad and Tobago (0.118), Nigeria (0.039), Kyrgyzstan (0.015), Vietnam (0.011), Argentina (0.005), and Greece (0.003).

The resemblance between Syria and the synthetic Syria is presented in Table 7. The high level of resemblance reached by the counterfactuals under this specification is due to the use of all pretreatment outcome values as predictors. However, because the covariates are receiving weights close to zero, most of the other predictor means do not reach a high level of similitude when compared to the treated countries.

Figure 1 depicts the synthetically constructed Syrian real GDP estimates. The in-sample estimates provided a good match with the actual series before the conflict. This is reflected in the small RMSPEs of 0.27, which are relatively small compared to the level of outcome variables. The estimates showed that Syrian real GDP was forecast to continue growing without the conflict, albeit at a slower rate than during the pre-conflict era. Specifically, the real GDP is estimated to be US\$ 43.6 billion at constant 2015 prices in 2019, compared with US\$ 34.3 billion at constant 2015 prices in 2010.

The counterfactuals presented for the post-treatment period could be considered optimistic for Syria which is a country located in the Middle East and North Africa (MENA) region. Indeed, as can be seen in Table 8, results for panel regression shows that countries in the MENA region lose around 1.4 percentage points of growth per year after 2010 when compared to the global average. It could be argued that the adverse conditions these MENA countries were facing post-2010 would prevail regardless of the Syrian conflict. These adverse conditions are not

TABLE 7 • GDP Level Predictor Means - All Pretreatment Outcome Values Used as Predictors

GDP level (in billions, 2015 US\$)	Syria	Synthetic Syria
1995	17.22	17.78
1996	18.91	18.71
1997	19.86	19.92
1998	21.20	20.64
1999	20.45	20.50
2000	32.34	31.98
2001	20.80	21.13
2002	21.63	21.86
2003	23.19	23.16
2004	24.79	24.70
2005	26.33	26.15
2006	27.66	27.61
2007	29.22	29.30
2008	30.53	30.83
2009	32.34	31.98
2010	34.02	34.27
Employment rate (%)	26.14	38.96
Agriculture (as % of GDP)	23.73	19.58
Industry (as % of GDP)	29.48	29.81
Trade (% of GDP)	16.64	46.06
Investment (as % of GDP)	12.31	16.73
Capital stock per capita (in logarithm, 2017 US\$)	9.77	9.81
Human capital (index)	2.20	2.11
Democracy proxy (index)	-7.31	1.14

Note: All variables are averaged for the 1995–2010 period.

captured by the synthetic controls, as none of the country in the control group (i.e., the 9 countries that make up the synthetic Syria) is from the MENA region. To account for the effect of the regional shocks, we incorporated the rate of adjustment suggested by the panel regression into the counterfactuals in the post-treatment period.

We then compared the actual and counterfactual GDPs. The comparison indicates a persistent negative impact of the conflict on Syria, and the gap

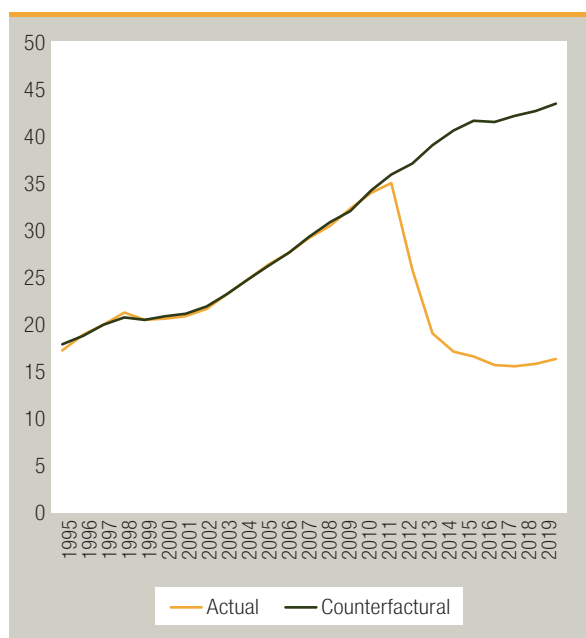
TABLE 8 • GDP Growth: Panel Data Analysis

	(1)	(2)	(3)
Dependent Variable	Real GDP annual growth	Real GDP annual growth	Real GDP annual growth
MENA*Post-Conflict	-0.737* (0.369)		-1.376** (0.448)
MENA*Pre-Conflict		1.64*** (0.282)	
Constant	3.98*** (0.087)	3.78*** (0.089)	2.330* (1.086)
Year Fixed Effects	No	No	Yes
Country Fixed Effects	No	No	Yes
R-squared	0.0012	0.0012	0.2329
Observations	3,982	3,982	3,982

Source: Authors' estimates based on the GDP real growth figures of 180 countries globally collected in the WDI.

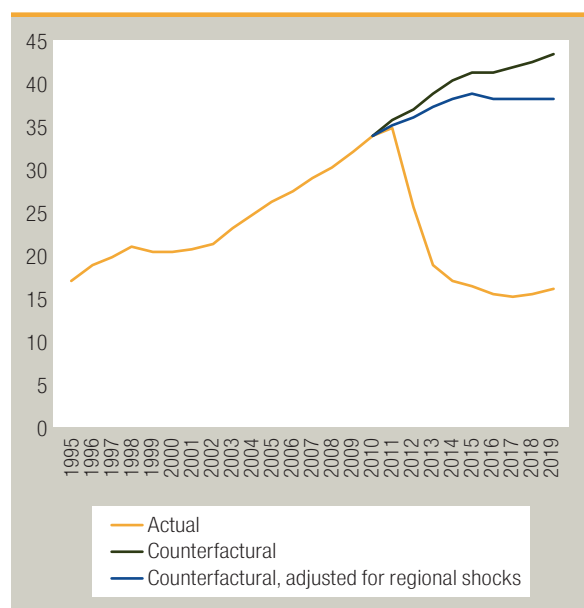
Note: *p<0.1; **p<0.05; ***p<0.01; "post-conflict" covers the period from 2011 to 2019; "pre-conflict" covers the period from 1995 to 2010.

FIGURE 33 • Actual and Counterfactual GDP (Billions, constant 2015 US\$)



Source: WDI; Penn World Table 10.0; Center for Systemic Peace; World Bank staff estimates.

FIGURE 34 • Actual and Counterfactual GDP, Adjusted for Regional Shocks (Billions, constant 2015 US\$)



Source: WDI; Penn World Table 10.0; Center for Systemic Peace; World Bank staff estimates.

APPENDIX 1 • Variables

Indicator Name	Definition	Data source
Real GDP (in billions, constant 2015 US\$)	GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. The real GDP is in constant 2015 US dollars.	WDI
Employment (employers per hundred persons)	It is calculated by dividing employers by the total population, which includes all residents regardless of legal status or citizenship. Employers are who, working on their own account or with one or a few partners, hold the type of job defined as a self-employment job, and have engaged, on a continuous basis, one or more persons to work for them as employees.	WDI
Trade openness (% of GDP)	It is proxied by total trade as share of GDP. Trade is the sum of exports and imports of goods and services measured as a share of GDP.	Penn World Table 10.0
Agriculture, value added (% of GDP)	Share of value added of agriculture in GDP. Agriculture includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.	WDI
Industry, value added (% of GDP)	Share of value added of industry in GDP. Industry includes mining, manufacturing, construction, electricity, water, and gas. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.	WDI
Gross capital formation (% of GDP)	Share of gross capital formation in GDP. Gross capital formation includes land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.	Penn World Table 10.0
Capital stock per capita (in logarithm, constant 2017 US\$)	It is calculated by dividing capital stock by total population. Capital stock is the net accumulation of a physical stock of capital goods, including buildings and the plant and machinery of a firm, industry or economy at any one point in time. The capital stock is at constant 2017 US dollars.	Penn World Table 10.0
Human capital (index)	It calculates the contributions of health and education to worker productivity. The final index score ranges from zero to 1, and measures the productivity of a future worker of a child born today relative to the benchmark of full health and complete education.	WDI
Political status (democracy proxy).	The index is computed in Polity Project initiated by Center of Systemic Peace. The proxy ranges from +10 (strongly democratic) to -10 (strongly autocratic). https://www.systemicpeace.org/inscrdata.html	Center for Systemic Peace

APPENDIX 2 • Countries Affected by an Exogenous Shock Dropped from the Pool of Donor Countries

Country	Shock
Bahrain	Arab Spring after 2011
Chad	War between 2005 and 2010
Cote d'Ivoire	Second Ivorian Civil War in 2011
Egypt	Arab Spring in 2011
Guinea	Hit by Ebola in 2014
Honduras	Coup in 2009
Iran	Sanctions in 2012
Israel	Affected by refugee movements
Japan	Fukushima disaster in 2011
Libya	Arab Spring after 2011
Morocco	Arab Spring 2011
Thailand	Floods in 2011
Tunisia	Arab Spring after 2011
Turkey	Affected by refugee movements
West bank and Gaza	Israeli conflict
Yemen	Arab Spring after 2011

between the actual and counterfactual GDP are widening. Specifically, we estimate that in 2019, Syria's GDP absent the conflict (the counterfactual) would have been US\$ 38.6 billion in 2015 constant prices, compared to US \$16.3 billion of the realized GDP (Figure 2).

Nowcasting Economic Activity Using Nighttime Lights

Introduction

Nighttime lights (NTLs) are a promising big data source that can be used to estimate real GDP and economic activity in general at a high frequency and granularity. NTLs represent both a substitute and a complement to standard data sources, which lack the granularity across space and time to track economic developments in a fragile, conflict, and violence (FCV) setting. NTL data also circumvent the typical challenges associated with data availability, reliability, comprehensiveness, and timeliness, which are compounded by conflict and crisis.

Although the use of NTLs in economics dates as far back as 2002 (Sutton, 2002), it was not until the seminal paper by Henderson (2011, 2012) that uncovered the link between luminosity and economic activity. Since then, NTLs have become a widely accepted proxy for economic activity at both national and subnational levels and have been shown to correlate strongly with annual movements in real GDP (Henderson 2012). Under the reasonable assumption that consumption of light increases with income, NTLs can serve as a proxy for economic activity (Donaldson, 2016). In the economics literature alone, over 150 papers have relied on night lights since 2012, partly owing to platforms such as Google Earth Engine that dramatically ease researcher access to the data (Gibson et al., 2021).

NTLs have been shown to correlate with various economic and demographic indicators, and therefore can be used to proxy for economic activity. In an early study on the link between luminosity and economic activity, NTLs have been shown to have a statistically significant relationship with population, economic development, and electric power consumption

(Elvidge, 1997). NTLs data have been used to measure the impact of economic policy shifts, such as India's 2016 demonetization, or geopolitical events, such as conflict outbreaks in Afghanistan (Beyer, 2018). Other research uses NTLs to estimate subnational estimates of economic activity in countries such as India (Beyer, 2018), Egypt (Omar, 2019), Turkey (Basihos, 2016), and the United States (Doll, 2006).

NTL data benefits from being high frequency, with high spatial granularity and broad coverage. The high-frequency nature of NTL data is perhaps the most attractive feature to economists, as it allows researchers to study the immediate impact of a shock. Satellites capture data from the same location at weekly or even daily frequencies, offering substantial temporal coverage. For example, a number of recent papers have studied the impact of COVID-19 containment measures on NTLs in India (Beyer, 2021), China (Elvidge 2020), and Morocco (Roberts, 2021). These papers benefited from the monthly frequency of NTLs to better isolate the shock, from the timeliness of NTLs data to monitor the impact with a shorter time lag, and from the credibility of the data used.

Another key advantage—relevant in both data-poor and data-rich environments—is the high spatial granularity of NTLs data over standard data sources, which allows researchers to drill down into subnational areas and study a much wider cross-section of areas. Such units include cities (Storygard, 2016), ethnic homelands (Alesina, 2016), or subnational administrative units (Hodler, 2014). NTLs also benefit from being collected uniformly and consistently, without regard to natural disasters or political strife, thereby allowing for broad data coverage across space and time. Finally, coming directly from impartial satellites, NTLs data is insulated from intervention by national statistical agencies or other data collection actors which can sometimes be inefficient or biased.

Using nighttime lights as a proxy for economic activity would help overcome several limitations in Syrian statistics. Currently, the data available from the national statistical office comes with significant uncertainty, while third-party estimates rely on heavy assumptions. Furthermore, typical measurement issues are associated with the accurate reporting of economic activity, considering the existence of

a large informal sector. Official statistics are also limited in their frequency, as only annual estimates are produced, and no monthly or quarterly estimates of economic activity are available. In addition, those estimates are produced with a long lag, which has been rising during the conflict, making it difficult to assess the state of the economy at a given time. Lastly, there is currently no information on the location of economic activity—such as per region or administrative area, preventing any spatial growth analysis, a critical limitation given that the conflict has a highly differentiated impact at the spatial level.

Data Description

In this study, similar to key papers in the literature, we use NTL data from the US Air Force Defense Meteorological Satellite Program (DMSP) and the Visible Infrared Imaging Radiometer Suite (VIIRS). Initially, the DMSP was a collection of satellites launched by the US Department of Defense in the 1960s to relay weather and climate data for tactical and strategic US military operations. These satellites take high-resolution pictures of the earth's surface at night, providing imagery of vital for weather predictions. Although these satellites were initially intended to monitor weather conditions for pilots, the scientific community quickly understood the potential of using this data in social sciences. Indeed, after the data was publicly archived in 1973, the first scientific paper to use this data appeared only five years later (Croft, 1978). However, the DMSP satellite comes with a number of technical limitations, including low radiometric and spatial resolution, saturation of images in urban cores, and no on-board calibration.

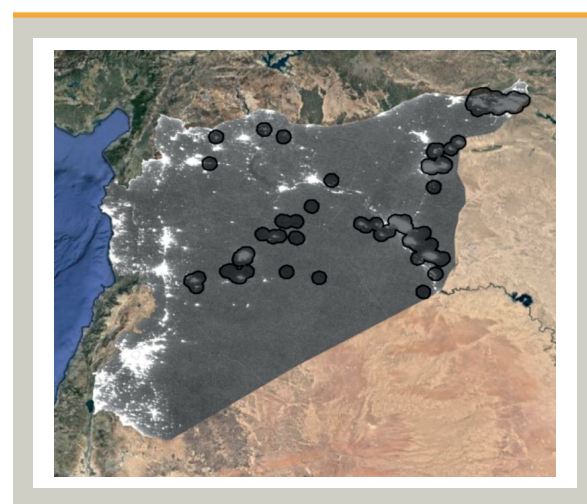
While the DMSP was discontinued in 2012, the VIIRS satellites were launched in its place by the National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA). While the DMSP was designed with Air Force pilots in mind, the design of VIIRS reflected the needs of researchers. The VIIRS satellite provides a number of improvements over the DMSP-OLS—including a wider detection range, finer quantization, lower detection limits, and in-flight calibration. Overall, these features help correct for

saturation of images and improve temporal comparability (Elvidge, 2013). Unlike the DMSP data that is only available at an annual level, the VIIRS data is also available at monthly and even daily frequencies.

For the purposes of this study, we use the DMSP and VIIRS NTL data to evaluate the Syrian crisis. The VIIRS satellite offers a higher temporal and spatial resolution than the DMSP satellite, while also providing a number of technical improvements with respect to measurement and accuracy. More importantly, the VIIRS data extends from April 2012 until present, covering the Syrian crisis entirely, and is available at the monthly frequency. This allows us to study the evolution of NTLs throughout the crisis at a high temporal and spatial resolution. On the other hand, the DMSP satellite is only available at the annual frequency and is useful in constructing a historical NTLs time series that can be used to infer the long-running relationship between NTLs and real GDP.

For our geographic boundaries, we use the United Nations Global Administrative Unit Layer (GAUL) dataset to clip our map and isolate NTLs only in Syria and within its subnational areas. Although the VIIRS data eliminates non-anthropogenic lights reflected from clouds, such as moonlight, for example, the lights emanating from ephemeral fires are not

FIGURE 35 • Map of Syria with NTLs and Known Flaring Sites



Source: Visible Infrared Imaging Radiometer Suite (VIIRS); Global Gas Flaring Reduction Partnership (GGFRP).

Note: The dark circles identify known flaring sites from the GGFRP.

removed. Given the high amounts of gas flaring in Syria, we use data from the World Bank Global Gas Flaring Reduction Partnership (GGFRP) to carve out NTLs that result from oil production (Figure 35). This step is important since the intensity of flaring can bias the results considerably, especially in the case of a small developing nation that already has low levels of brightness and high levels of flaring.

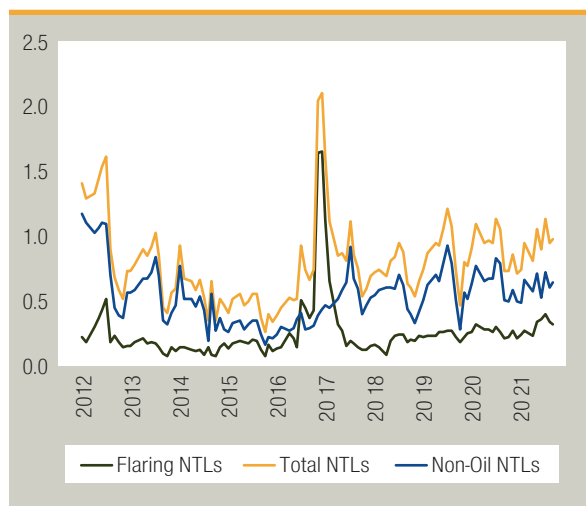
To convert NTLs from pixel-radiance values on a map to a single value, we use the well-known “Sum-of-Lights” method. This method sums up all the radiance values for every pixel under the Syrian map, creating a single estimate for aggregate brightness in the country. This can be done at the national, subnational, or district level, giving researchers the freedom to fully customize the analysis. To carve out the effects of flaring, we estimate the Sum-of-Lights for all areas that have been tagged as flaring sites by the World Bank’s GGFRP dataset. Next, we subtract these flaring NTLs from the total estimate, giving us an estimate of non-oil-related NTLs. This allows us to remove these extremely bright lights that otherwise bias our NTLs estimates and focus only on conventional sources of electrical lights. Since the existing NTLs literature mainly focuses on electrical sources of lights, this remains the main focus of our study. This is particularly important in the case of Syria, as flaring nearly quadrupled in early 2017, while remaining relatively flat otherwise. A

possible explanation for this sharp increase in flaring NTLs could be related to the wider conflict in general. The time series for total, flaring, and non-flaring (total minus flaring) is shown in the Figure 36 below.

Besides aggregating at the national or country level, we can also aggregate non-oil NTLs by sub-national regions (Figure 37). This allows us to drill down into the spatial dynamics of NTLs and understand the sources of economic growth or loss. The figures below show the evolution of non-oil NTLs by administrative-1 areas and their respective six-month moving average. In general, most areas exhibit a U-shaped pattern beginning in 2014 and bottoming out in 2017. Some areas recover by 2019 and continue to grow, while others decline going into 2020 and beyond. Finally, the pace of recovery is uneven across regions, as some areas remain relatively flat throughout the entire period and do not show major swings or changes.

While the figures above are useful in understanding the evolution of NTLs within each area, they are not useful in comparing between areas. This is because the geographic size or population density can vary widely among the different regions, producing NTLs estimates that are not directly comparable. One way to adjust the NTLs estimates so they can be comparable is to create an NTLs-per-capita estimate by dividing the total NTLs by population size. Overall, the remaining areas show a large decline in NTLs per capita since 2018, with large variation between the areas (Figure 38). In 2021, some areas recover slightly while others worsen, suggesting that the recovery has not been the same among all regions.

FIGURE 36 • Evolution of Flaring, Non-Oil, and Total NTLs

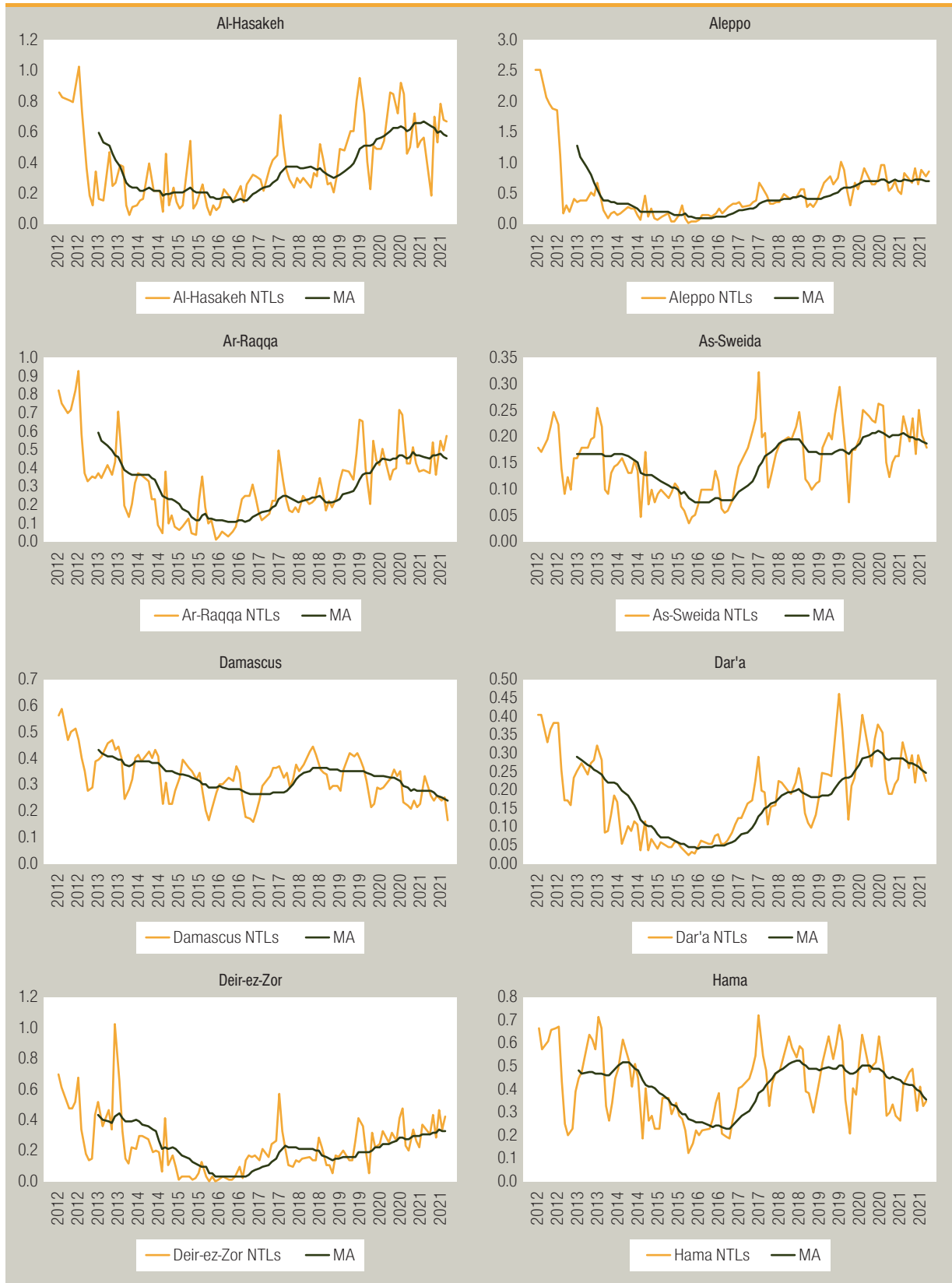


Source: VIIRS; GGFRP; World Bank staff estimates.

Regression Analysis

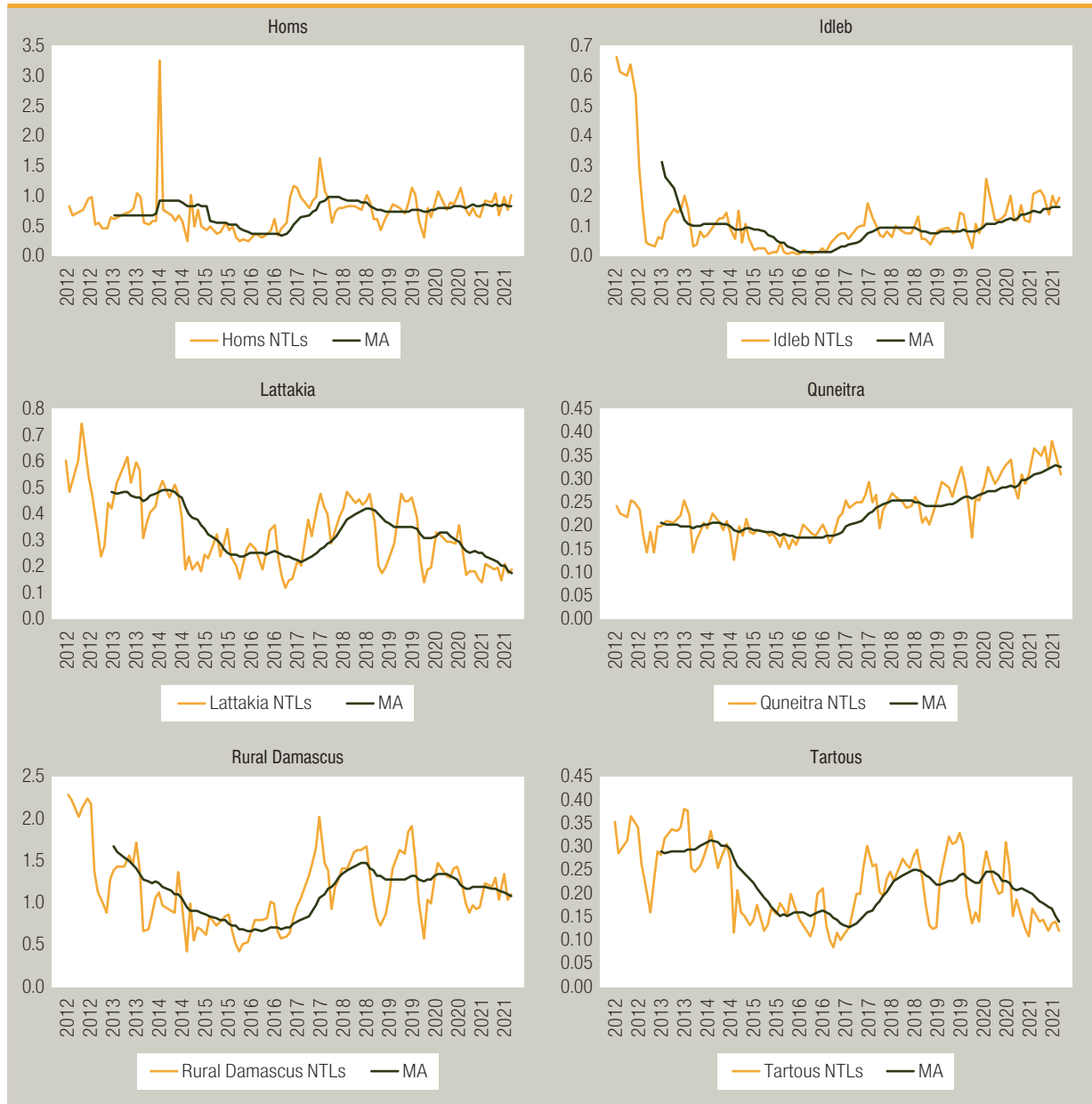
By exploiting the overlapping year between VIIRS and DMSP, we can construct a historical time series of NTLs from 1992 through 2021 at the annual level (Figure 5). Using the DMSP dataset, we construct national “Sum-of-Lights” estimates annually for 1992–2013. When combining the two annual datasets, we apply annual DMSP growth rates for 2012 (the overlapping year) to the VIIRS time series in order to extend the dataset from 2012 to 2011. We repeat this procedure for the following years to continue extrapolating the VIIRS time series backward using DMSP growth rates until

FIGURE 37 • Evolution of Non-Oil NTLs by Subnational Regions



(continued on next page)

FIGURE 37 • Evolution of Non-Oil NTLs by Subnational Regions *(continued)*



Source: VIIRS; World Bank staff estimates.

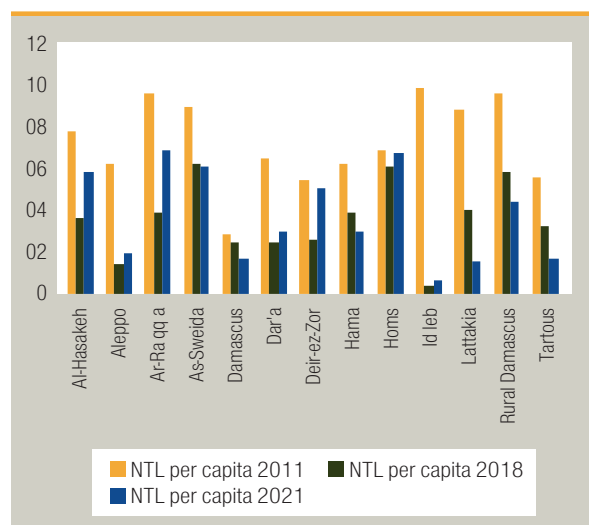
1992. We extrapolate the VIIRS time series backward to 1992 instead of forecasting the DMSP series from 2013 onward because the VIIRS satellite is considered more accurate than the DMSP and does not suffer from issues of top coding.⁶⁶

To establish whether NTLs have a long-running relationship with economic activity, we regress them against real GDP and real GDP growth rates, using the procedure outlined by Henderson, Storeygard

and Weil (2012). Annual Real GDP data for Syria were obtained from the World Bank's World Development Indicators (WDI) and are in constant 2015 US dollars. Figure 40 below plots Syrian GDP against national NTLs from 1992 until 2020. NTLs and GDP climb

⁶⁶ Top-coding occurs when pixels in bright areas, such as in city centers, reach the highest possible digital value (i.e., 63 for DMSP), and no further details can be recognized.

FIGURE 38 • Per Capita NTLs by Subnational Region

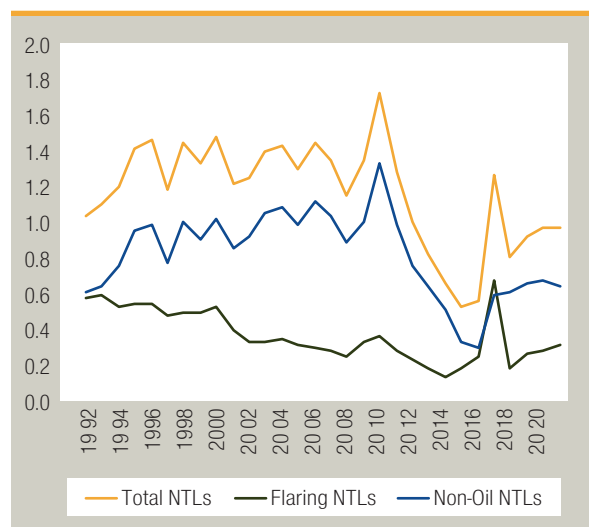


Source: VIIRS; United Nations World Population Prospects; World Bank staff estimates.
 Note: Quneitra was found to be a large outlier and was removed from the figure. This is likely because of its proximity to the borders of Israel, producing NTL-capita estimates far higher than other regions.

steadily from 1992 until 2010, although the growth in GDP was relatively higher than NTLs from 2003 to 2011. Both NTLs and GDP peak in 2010 and suffer large losses throughout 2015, and afterward NTLs slightly recover while GDP remains subdued.

The regression results show positive and significant results for all specifications (Table 9). In the first

FIGURE 39 • Historical NTL Time Series (1992-2021)



Source: VIIRS and DMS; World Bank staff estimates.

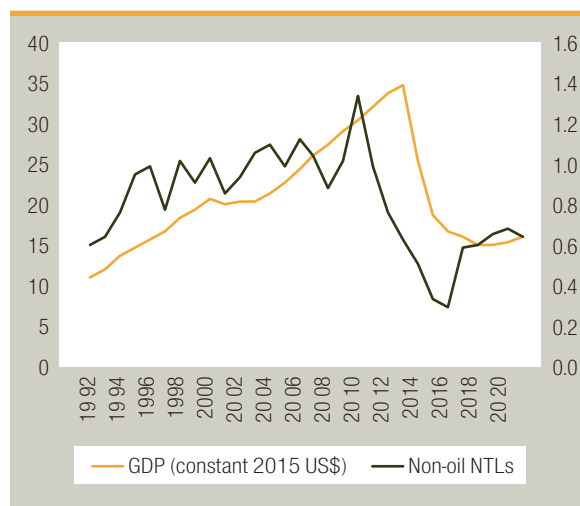
TABLE 9 • Regression Results of Historical NTLs and Real GDP

Dependent Variable	(1)	(2)	(3)
	log(GDP)	GDP	GDP
log(NTLs)	0.726*** (0.009)		
NTLs		0.072*** (0.005)	
NTLs * Pre-Conflict			0.071** (0.008)
NTLs * Post-Conflict			0.038** (0.015)
Observations	28	28	28
R ²	0.823	0.861	0.882
Adjusted R ²	0.879	0.853	0.881

Note: *p<0.1; **p<0.05; ***p<0.01

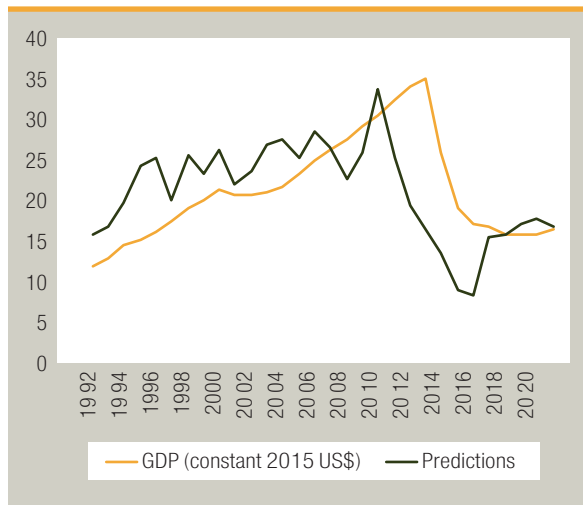
specification, NTLs are regressed against real GDP in logarithmic form. In the second, both are regressed against each other in levels. While this second specification shows the absolute relationship between the two variables, the interpretation is ambiguous due to the large differences in units. However, the first specification reveals the percent-to-percent elasticity between

FIGURE 40 • Historical NTLs and Real GDP (1992-2021)



Source: VIIRS and DMS; GDP data comes from the World Bank's World Development Indicators.

FIGURE 41 • Model Predictions of Real GDP from NTLs



Source: World Bank staff estimates.

NTLs and GDP, which reveal a clearer relationship between the two. This coefficient for this regression is 0.726, suggesting that for every 1 percent increase in NTLs, real GDP increases by almost three-quarters of a percent. Although this estimate is slightly higher than the estimates of Henderson (2012), it remains within the 95 percent confidence interval, giving some additional confidence to the estimate.

In the third specification, we consider if the conflict substantially changes the relationship between NTLs and GDP. This is done by creating a dummy variable equal to 0 pre-conflict (1992 until 2010) and equal to 1 post-conflict and continues until present (2011 until 2021). This allows the regression to estimate two unique elasticities between NTLs and GDP for both the pre- and post-conflict periods. The results show that both elasticities are positive and significant, while the post-conflict estimate is approximately half the magnitude of the pre-conflict estimate. This suggests that NTLs are contributing less to national income during the conflict, as NTL use is diverted to less productive areas of the economy. Moreover, the increase in R-squared (R^2) by adding the conflict dummies is marginal, suggesting that information gain by separating the two periods is limited.

These coefficients are useful because they allow us to convert our NTL observations into GDP estimates, revealing the regional and temporal

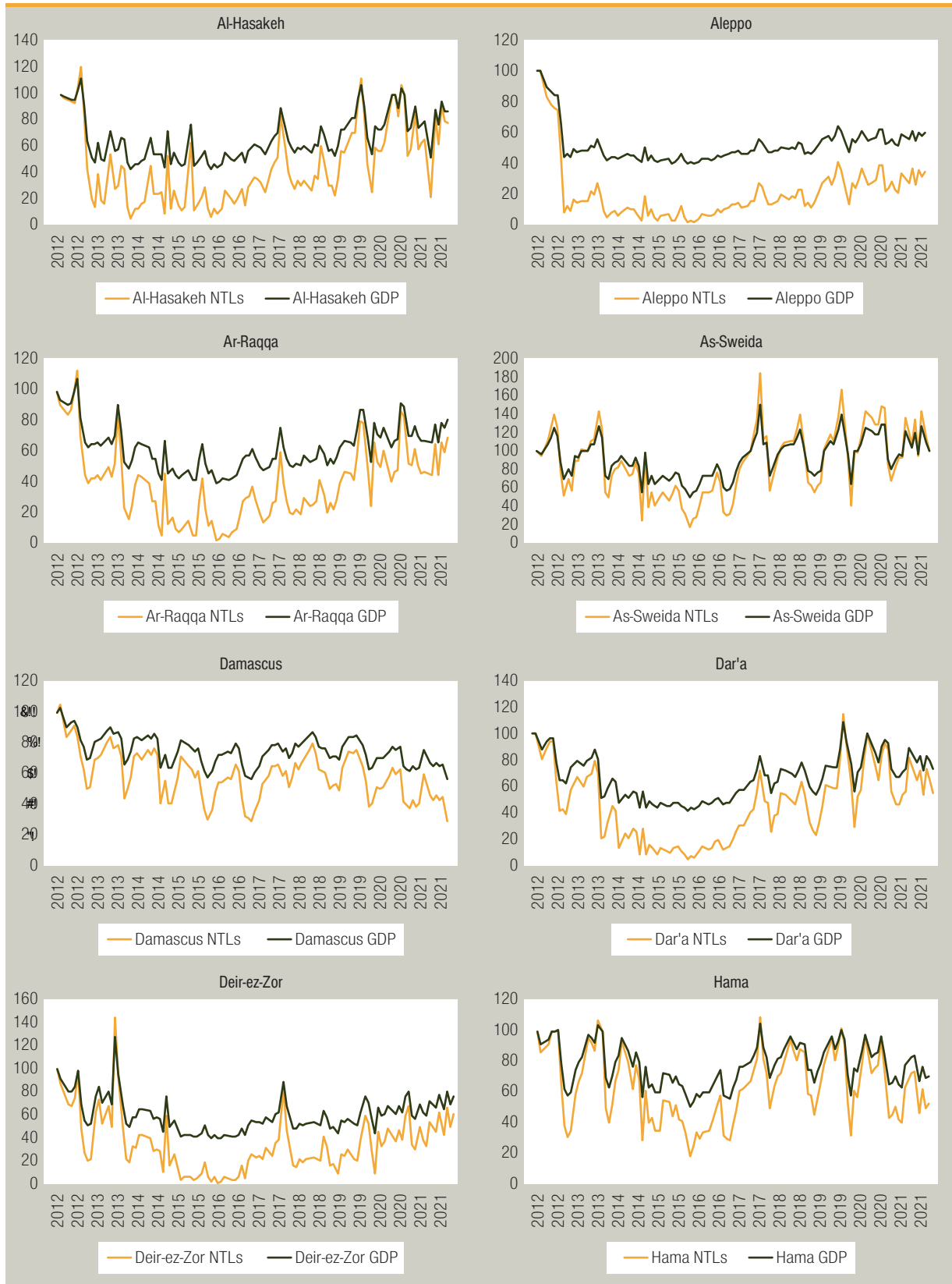
dynamics of growth. The analysis below shows regional NTLs as an index (April 2012 = 100) along with its associated GDP estimates expressed also as an index. The relationship between the NTL and GDP indexes is found in the log-log regression specification (2). The coefficient translates between percent NTL growth and GDP percent growth, namely 0.726, and allows us to estimate the associated change in GDP. This can be done at both the national level and subnational level as Figure 41 and Figure 42 below show. One notable observation is that the model predictions are well below the official GDP estimates between 2010 and 2017. This indicates that the economic contraction Syria is experiencing could be worse than Syrian statistics suggest.

To extend the analysis beyond the national and subnational levels, we can use these regional NTL estimates to study the relationship *between* areas. This is most often done by studying inequality between groups by using the well-known “Gini Index,” which is commonly used with income instead of NTLs. However, given the large literature on NTLs in economics in addition to the regression evidence shown above, we are comfortable using NTLs as a fair proxy for income instead. To adjust NTLs so that they are comparable, we calculate an NTL-per-area measure that divides absolute NTLs by the geographical spatial extent. This is done in the absence of consistent annual population data that would have allowed us to do the analysis using NTLs-per-capita instead. Figure 43 below shows the evolution of the Gini Index for Syria annually from 1992 until 2021. The results show a sharp decline in inequality during the beginning of the 1990s, which steadily declines until 2010. Soon after the conflict began in 2011, inequality worsened, although there has been some improvement since 2016 when the intensity of the conflict in Syria declined.

Connectedness between the Syrian and Lebanese Pounds

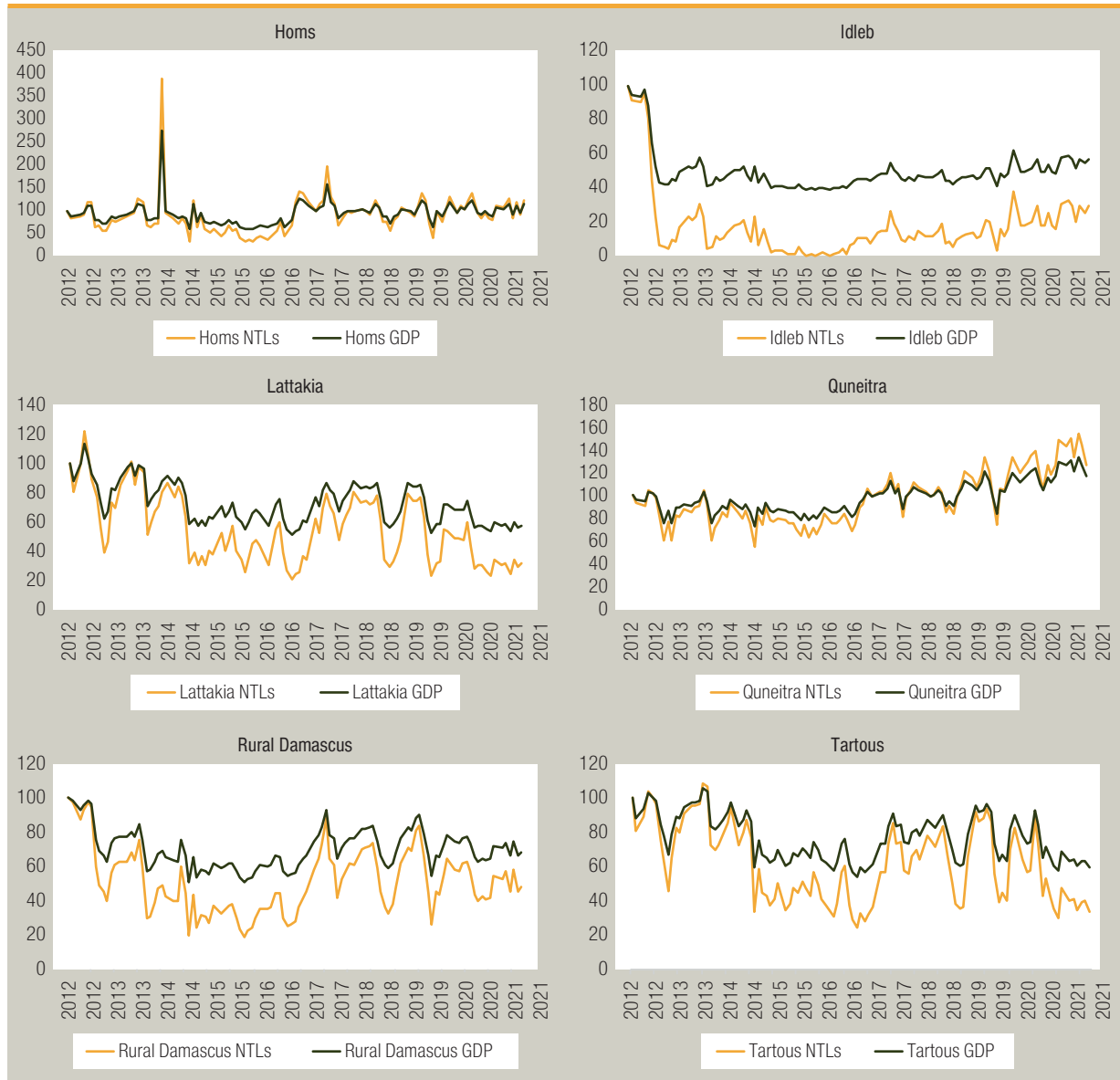
This note analyzes connectedness (or spillovers) between the Syrian pound (SYP), Lebanese Pound (LBP), and Turkish Lira (TRY).

FIGURE 42 • Model Predictions of Real GDP by Subnational Region



(continued on next page)

FIGURE 42 • Model Predictions of Real GDP by Subnational Region (continued)



Source: World Bank staff estimates.

Granger causality

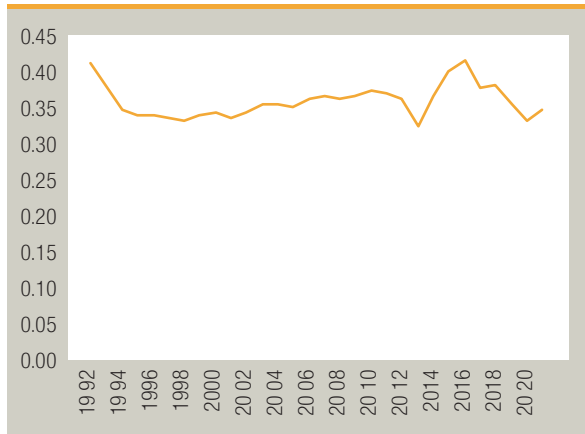
The exposition in this section draws on Dagher et al. (2020). In a seminal contribution to the literature, Granger (1969) introduces a concept of causality that closely ties to the predictive power of one variable for another. Let y_{1t} and y_{2t} denote two time series.⁶⁷ The variable y_{2t} is said to Granger-cause y_{1t} when accounting for the information in lowers the Mean Square Prediction Error (MSPE) in y_{1t} .

More formally, let Ω_t denote the information set at time t and $y_{1,t+h|\Omega_t}$ denote the optimal (i.e., lowest MSPE) h -step prediction of y_{1t} . Let $\sigma_{y_1}^2(h/\Omega_t)$ denote the MSPE of the variable y_{1t} . Kilian and Lütkepohl (2017) note that the process y_{2t} is said to Granger-cause the process y_{1t} if:

$$\sigma_{y_1}^2(h/\Omega_t) < \sigma_{y_1}^2(h/\Omega_t\{y_{2s} | S \leq t\}),$$

⁶⁷ Kilian and Lütkepohl (2017) and Lütkepohl (2005) are excellent references on Granger causality testing.

FIGURE 43 • NTL-Based Gini Index



Source: World Bank staff estimates.

where $\Omega_t(y_{2s} | S \leq t)$ denotes the information set excluding past and present information regarding the series y_{2t} . In other words, the process y_{2t} is said to Granger-cause the process y_{1t} if exploiting information on the past and contemporaneous values y_{2t} lowers the prediction error of the process y_{1t} at some horizon h .

In a bivariate setting, the variable y_{2t} does not Granger cause y_{1t} if and only if:

$$y_{1t+h|\Omega_t} = y_{1t+h|\Omega_t \setminus \{y_{2s} | S < t\}}$$

That is, omitting past information on y_{2t} yields an inferior forecast y_{1t} of than that obtained when lagged values of y_{2t} are included.

Tests of Granger causality are performed by placing restrictions on the coefficients of a Vector Autoregression (VAR). Denote by a vector of variables

of interest. A VAR relates y_t to ρ of its lags. A test of Granger causality amounts to a test of zero restrictions on a subset of the coefficients of the VAR.

Suppose that the data generating process is a VAR(ρ). Granger causality testing can be undertaken within a bivariate VAR (Lütkepohl and Kratzig, 2004):

$$\begin{bmatrix} Y_{1t} \\ Y_{2t} \end{bmatrix} = \sum_{j=1}^{\rho} \begin{bmatrix} \alpha_{11,j} & \alpha_{12,j} \\ \alpha_{21,j} & \alpha_{22,j} \end{bmatrix} \begin{bmatrix} Y_{1t-1} \\ Y_{2t-1} \end{bmatrix} + \begin{bmatrix} U_{1t} \\ U_{2t} \end{bmatrix},$$

by testing the null that $\alpha_{12,j} = 0$, which implies that y_{2t} does not Granger cause y_{1t} . That is, if the coefficients associated with the lags of y_{2t} are statistically significant, then y_{2t} Granger-causes y_{1t} .

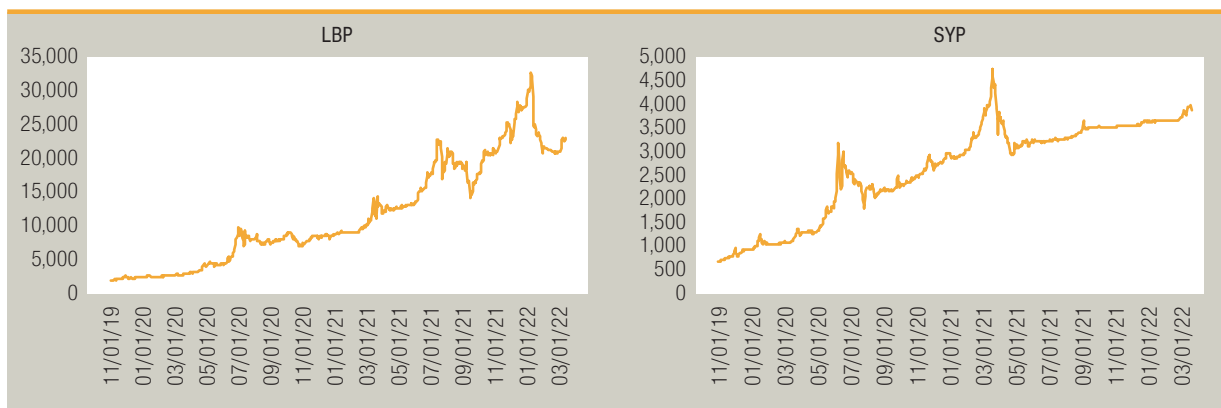
The analysis begins with the LBP and SYP. The empirical analysis is undertaken with daily data on the LBP and SYP for the period November 1, 2019 to March 18, 2022. The levels of the two exchange rates are provided in Figure 44. The data for the SYP are obtained from the website Syrian Pound Today (<https://sp-today.com/en/>), while the data for the LBP are obtained from the website Lira Rate (<https://lirarate.org/#pills-sayrafa>).

The correlation between the levels of the LBP and SYP is 0.83. However, due to the non-stationarity in the two exchange rates, this correlation is likely to be spurious.

When modeling the relation between the LBP and SYP, the logarithmic (or continuously compounded) returns on each currency are employed. Let S_t denote the units of LBP or SYP per US dollar. The return on currency j is defined as:

$$r_{jt} = \log(S_{jt}) - \log(S_{j,t-1}).$$

FIGURE 44 • The Levels of LBP and SYP



Conducting the empirical analysis with returns allows for circumventing statistical issues pertaining to non-stationarity. Figure 45 provides the time series dynamics of the returns on LBP and SYP.

Figure 45 suggests commonalities in the clusters of volatility for the two returns. This indicates a potentially significant spillover in volatility between the two returns. In addition, the volatility in the returns on the LBP appears to be significantly larger than the volatility in the return on the SYP toward the end of the sample. Indeed, the SYP's volatility appears to have decreased markedly since mid-2021.

The results of the Granger causality tests are provided in Table 10.⁶⁸

The results from the Granger causality tests suggest that, as a first major takeaway, changes in the LBP Granger cause changes in the SPY while the converse is not true (i.e., SPY does not Granger cause LBP).

TABLE 10 • Granger Causality Tests with the Levels and Returns of the LBP and SYP

Panel A: Granger causality tests with returns		
	F-statistic	p-value
LBP does not Granger Cause SYP	1.84	0.000
SPY does not Granger Cause LBP	0.66	0.969
Panel B: Granger causality tests with levels		
	F-statistic	p-value
LBP does not Granger Cause SYP	1.44	0.025
SPY does not Granger Cause LBP	0.59	0.991

⁶⁸ The results reported in Table 1 are obtained using a fixed lag length of 60. However, for robustness, Granger causality tests are computed for varying lag lengths, from 20 to 60 lags. The results are consistent with those reported in Table 1. The *p*-value associated with the Granger causality test in levels is obtained using the bootstrap.

FIGURE 45 • The Returns on LBP and SYP



FIGURE 46 • Autocorrelation and Lead-Lag Relation between the LBP and SYP

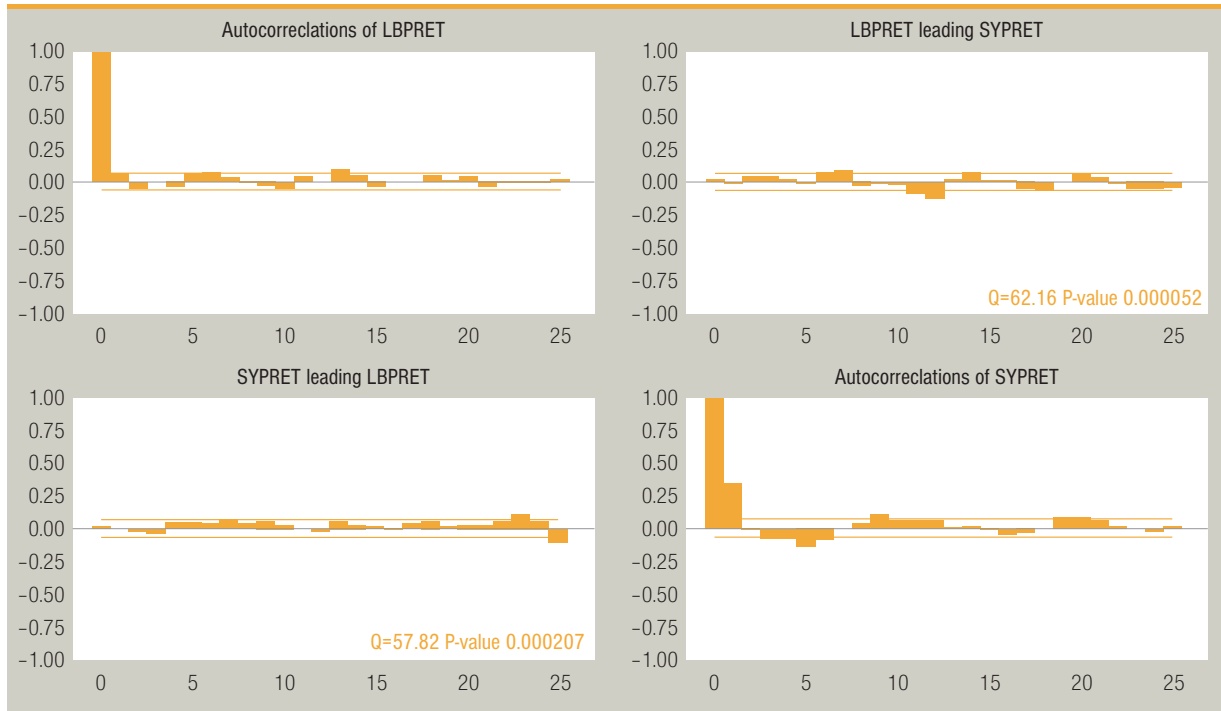


Figure 46 provides the autocorrelations and the lead-lag relation between SYP and LBP. The evidence suggests the existence of lead-lag relation between the SYP and LBP. However, the evidence in favor of the LBP leading the SYP is stronger.

Time-varying correlation and quantile dependence

Time-varying correlation

The correlation between the LBP and SYP is assessed in more detail next. More specifically, the time-varying correlation between the returns on the LBP and SYP is computed as:

$$\rho_{12t} = \frac{\text{cov}_t(r1, r2)}{\sigma_{1t}\sigma_{2t}},$$

where cov_t is the time-varying covariance between the returns on the SYP and LBP and σ_{1t} and σ_{2t} are, respectively, the time-varying volatilities of the returns on the SYP and LBP.

Figure 47 provides the time-varying correlation between the returns on the LBP and SYP.

The correlation was very high throughout January 2020 and peaked at 0.73. The correlation also increased during the summer of 2021 and has increased markedly since February 2022.

Multivariate conditional heteroskedasticity model

The time-varying correlation is estimated using a multivariate Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. More specifically, let denote the vector of returns. The time-varying conditional covariance model is given by (Hurn et al., 2021):

$$r_t = E_{t-1}(r_t) + u_t,$$

$$H_t = E_{t-1}(u_t u_t'),$$

where

$$H_t = \begin{bmatrix} h_{11t} & h_{12t} & \dots & h_{1Nt} \\ \vdots & \vdots & \ddots & \vdots \\ h_{N1t} & h_{N2t} & \dots & h_{NNt} \end{bmatrix}$$

is a time-varying estimate of the conditional covariance matrix. The univariate GARCH model can be extended to a multivariate version, which allows the variances and covariances to be time-varying.

FIGURE 47 • Time-Varying Correlation between the Returns on the LBP and SYP

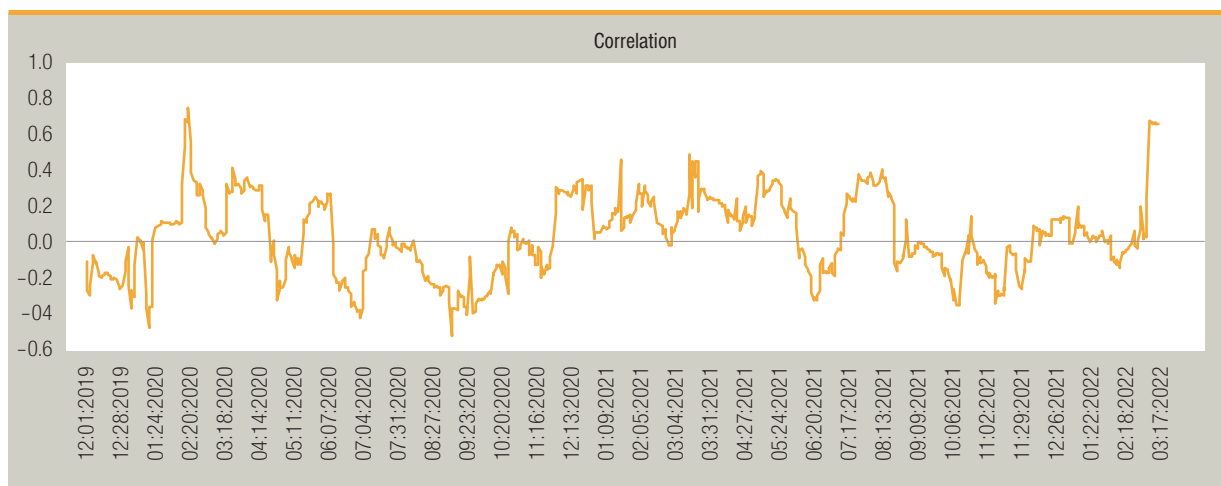
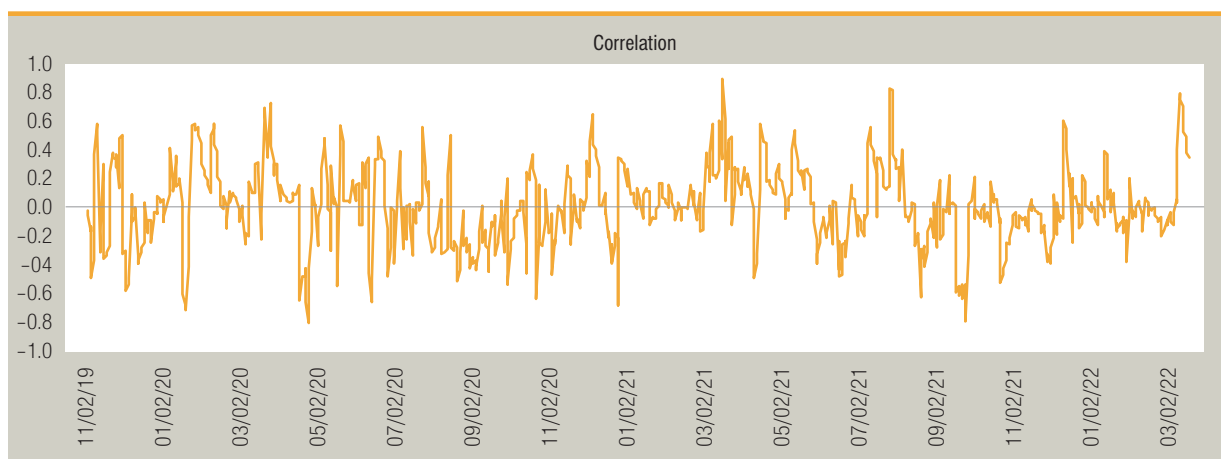


FIGURE 48 • Time-Varying Conditional Correlation between the Returns on the LBP and SYP



The BEKK model is a multivariate analogue of the univariate GARCH model. The BEKK specification is given by:

$$H_t = CC' + Au_{t-1}u'_{t-1} + BH_{t-1}B'$$

where C is an $(N \times N)$ lower triangular matrix of unknown parameters, and A and B are $(N \times N)$ matrices each containing N^2 parameters associated with the lagged disturbances and the lagged conditional covariance matrix, respectively.

A diagonal BEKK model is estimated. For $N = 2$, the diagonal BEKK model is given by:

$$C = \begin{bmatrix} C_{11} & 0 \\ C_{21} & C_{22} \end{bmatrix} \quad A = \begin{bmatrix} a_{11} & 0 \\ 0 & a_{22} \end{bmatrix} \quad B = \begin{bmatrix} b_{11} & 0 \\ 0 & b_{22} \end{bmatrix}$$

The conditional correlation between the returns on SYP and LBP is provided in Figure 48.

Not surprisingly, the conditional correlation is noisier than the historical correlation in Figure 47. Nonetheless, the results suggest an increase in correlation between the two currencies in November 2019, February 2020, and May 2020. The conditional correlation between SYP and LBP has also been elevated since early 2022.

For completeness, Figure 49 reports the conditional volatility of LBP and SYP obtained from univariate GARCH (1,1) models.⁶⁹

⁶⁹ The conditional volatility series is employed in the volatility spillovers analysis. Diebold and Yilmaz (2009) compute volatility using the highest and lowest prices during the

FIGURE 49 • Conditional Volatility of LBP and SYP

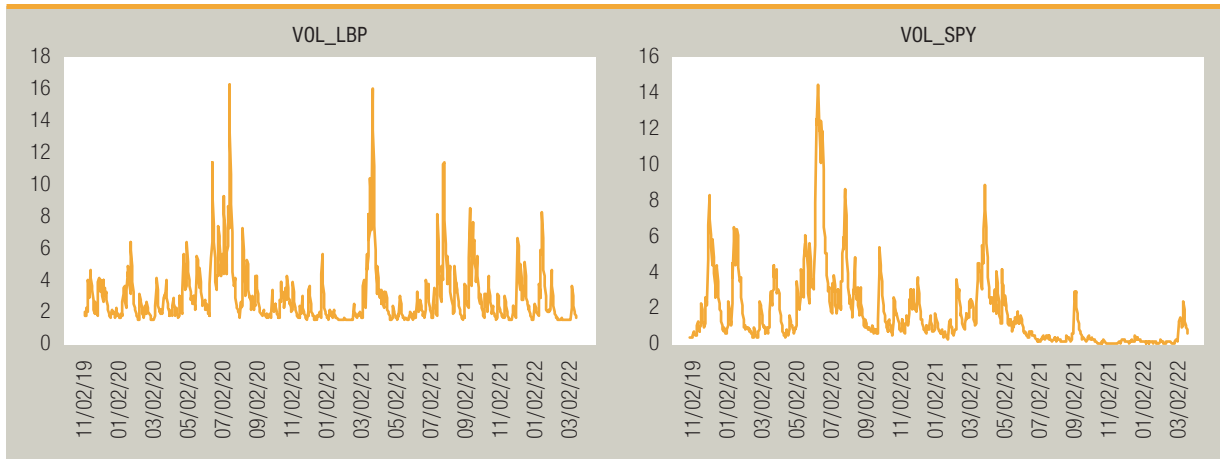


FIGURE 50 • Quantile-Quantile Plot of the Returns on the LBP and SYP

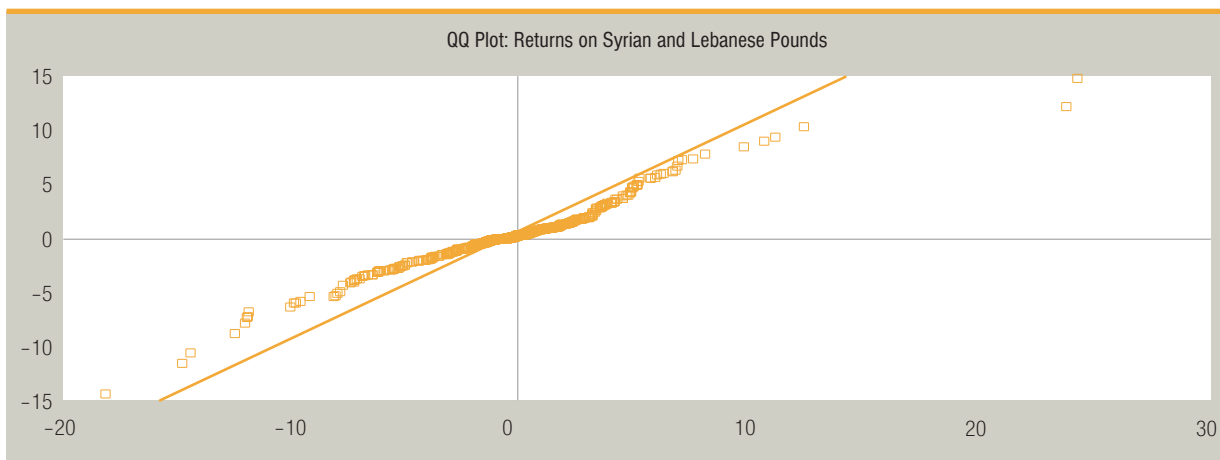


Figure 49 suggests strong commonalities (or connectedness/spillover) in the volatility between SYP and LBP. However, there also appears to be a possible decoupling in the two series since July 2021, which is a period of massive shortages of fuel and diesel in Lebanon. The decoupling in the volatility persisted after September 2021, the effective date of the termination of subsidies in Lebanon.

Dependence in quantiles

The dependence between the SYP and LBP may be more pronounced in the quantiles. Therefore, a Quantile-Quantile (QQ) plot, which illustrates the relationship between the quantiles of the two returns, is provided in Figure 50.

Figure 50 is indicative of the existence of a relation between the quantiles of the two returns.

Following Patton (2013), the sample quantile dependence at quantile α is computed as:

$$\rho_{\alpha} = \left\{ \begin{array}{l} \frac{1}{\alpha T} \sum_{t=1}^T I(r_{1t} \leq q, r_{2t} \leq q, 0 < q < 0.5) \\ \frac{1}{(1-\alpha)T} \sum_{t=1}^T I(r_{1t} > q, r_{2t} > q, 0.5 < q < 1) \end{array} \right\},$$

day. The observations for the high and low prices are not available for LBP and SYP. Therefore, the latent volatility is estimated using conditional heteroskedasticity models. Alternatively, volatility can be estimated as the square of the daily return. However, the latter estimate of volatility is noisy. If intra-daily data were available, realized volatility could be computed from the high-frequency data.

For $0 < q < 0.5$, the sample quantile dependence is 0.92 while it is 0.18 for $0.5 < q < 1$. This suggests that the dependence between the two returns in the lower quantiles is very high while it is weak in the upper quantiles. Therefore, the downward movements in the SYP and LBP are closely associated with each other.

Measuring network connectedness and spillovers

Measuring connectedness and volatility spillovers

In general terms, connectedness is measurable as the relative importance of the exogenous variations of unit i in explaining variations in unit j . As succinctly noted in Ferroni and Canova (2022), this corresponds, in the context of a VAR, to the fraction of the forecast error variance of unit j , explained by shocks originating from unit i at a given horizon.

In two influential contributions, Diebold and Yilmaz (2009, 2012) propose measures of connectedness, or volatility spillovers, which can be easily constructed from the variance decompositions of a VAR.

More specifically, Diebold and Yilmaz (2009) offer a method to compute a total volatility spillover index from a VAR model identified using a Cholesky decomposition while, cognizant of the fact that the results obtained a VAR identified using a Cholesky decomposition are not invariant to the ordering of the variables, Diebold and Yilmaz (2012) build on their earlier work to advocate the use of a variance decompositions obtained from the generalized VAR framework of Koop, Pesaran, and Potter (1996) and Pesaran and Shin (1998).

In Diebold and Yilmaz (2012), the authors also extend their earlier work by proposing, in addition to the total spillover index introduced in Diebold and Yilmaz (2009), measures of directional spillovers and net spillovers in volatility. This section introduces the measures of total and directional volatility spillovers, and applies them to the volatilities of SYP, LBP, and the Turkish Lira (TRY).⁷⁰

Starting from a covariance stationary N -variable VAR (ρ):

$$x_t = \sum_{i=1}^{\rho} \phi_i x_{t-1} + \varepsilon_t,$$

where ε is a vector of independently and identically distributed disturbances. The moving average representation is:

$$x_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i},$$

Where the $N \times N$ coefficient matrices A_i obey the recursion $A_i = \phi_1 A_{i-1} + \phi_2 A_{i-2} + \dots + \phi_{\rho} A_{i-\rho}$, with A_0 being an $N \times N$ identity matrix and with $A_i = 0$ for $i < 0$.

The variance decompositions allow for assessing the fraction of the H -step-ahead error variance in forecasting x_j that is due to shocks to x_i , $\forall i \neq j$. The variance decomposition is also the basis for computing the variance shares, total, directional, and net spillovers discussed next.

The own variance share is defined as the fraction of the H -step-ahead error variances in forecasting x_i that are due to shocks to x_i for $i = 1, 2, \dots, N$. The cross variance shares, or spillovers, are the fraction of the H -step-ahead error variances in forecasting x_i that are due to x_j for $j = 1, 2, \dots, N$, such that $i \neq j$.

Denoting the H -step-ahead error variance decomposition by $\theta_{ij}^g(H)$, for $H = 1, 2, \dots$, we have:

$$\theta_{ij}^g(H) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} (e_i' A_h \Sigma e_i)^2}{\sum_{h=0}^{H-1} (e_i' A_h \Sigma A_h' e_i)}$$

Where Σ is the variance matrix for the error vector ε , σ_{jj} is the standard deviation of the error term for the j^{th} equation, and e_i is the selection vector, with one as the i^{th} element and zero otherwise. It should be noted that $\sum_{j=1}^N \theta_{ij}^g(H) \neq 1$. The normalized variance decomposition is:

$$\tilde{\theta}_{ij}^g(H) = \frac{\theta_{ij}^g(H)}{\sum_{j=1}^N \theta_{ij}^g(H)},$$

Note that, by construction

$$\sum_{j=1}^N \tilde{\theta}_{ij}^g(H) \neq 1 \text{ and } \sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H) = N.$$

The total volatility spillover index can be constructed from the total volatility spillover index as:

⁷⁰ The analysis is based on the variance or volatility obtained from the GARCH (1,1) model for each currency.

$$S^g(H) = \frac{\sum_{i \neq j}^N \tilde{\theta}_{ij}^g(H)}{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{i \neq j}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100.$$

The directional volatility spillover received by currency i from all other currencies j is given by:

$$S^g(H) = \frac{\sum_{i \neq j}^N \tilde{\theta}_{ij}^g(H)}{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{i \neq j}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100.$$

In a similar vein, the directional volatility spillover transmitted by currency i from all other currencies j is given by:

$$S^g(H) = \frac{\sum_{i \neq j}^N \tilde{\theta}_{ij}^g(H)}{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{i \neq j}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100.$$

The directional volatility spillovers provide a decomposition of the total spillovers to those from or to a particular source. The net spillover from currency i to all other currencies j is the difference between the gross volatility shocks transmitted and those received from other currencies while the net pairwise volatility spillover between currencies i and j is the difference between the gross volatility shocks transmitted from currency i to currency j .

Volatility spillovers: SYP and LBP

This section examines the volatility spillovers between the (returns on) LBP and SYP using a 200-day rolling sample. Figure 51 provides the total volatility spillover index constructed in this manner. Figure 51 provides the total volatility spillovers between SYP and LBP.

Figure 51 shows that the volatility spillovers between SYP and LBP are elevated in June 2020 and in May and June of 2021. The total volatility spillover index reaches a maximum of 16.06 percent on June 9, 2021. That is, the volatility spillovers increased at the onset of Lebanon's financial crisis as well as during the episodes of fuel shortages in the summer of 2021. The total spillover has also increased, albeit more moderately, in March 2022.

In order to discern the drivers of the increase in volatility, the analysis proceeds with an examination of directional and net volatility spillovers. Figure 52 provides the directional volatility spillovers.

The directional volatility spillover analysis suggests that the increase in the total spillover index in June 2020 and March 2022 originates from shocks to the volatility of LBP, while the increase in the spillovers in May and June 2021 appears to be ascribable to shocks in the volatility of the SYP.

Volatility spillovers: SYP, LBP and TRY

The volatility spillovers analysis is extended by including TRY. Figure 53 provides the volatility of the SYP, LBP and TRY.

The TRY exhibited significant volatility in November and December of 2021. Figure 53 shows these large swings. Indeed, the TRY depreciated significantly following the Central Bank's unorthodox decision to decrease its policy rate on December 16 amid rising inflation.

FIGURE 51 • Total Volatility Spillover Index: LBP and SYP

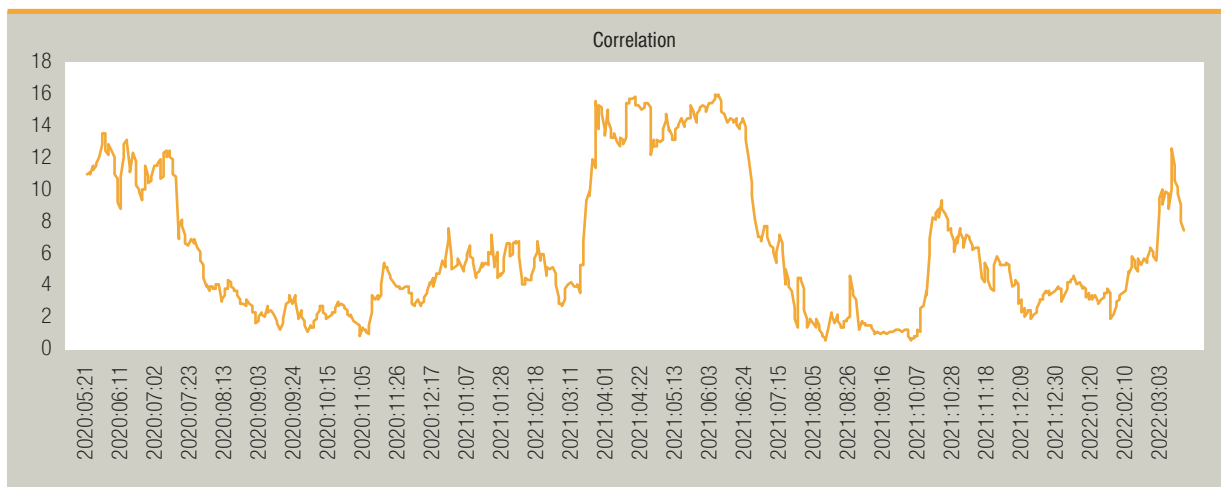


FIGURE 52 • Directional Volatility Spillovers (FROM)

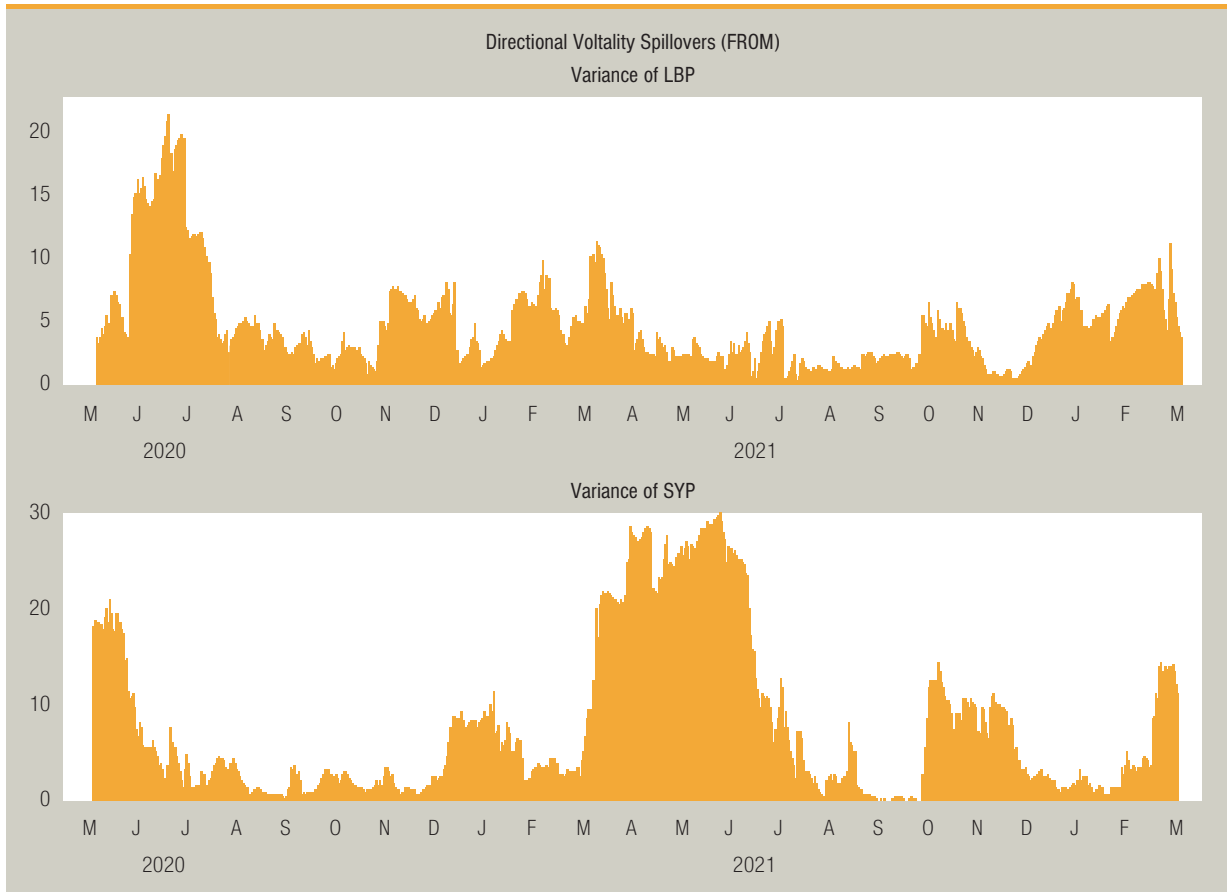
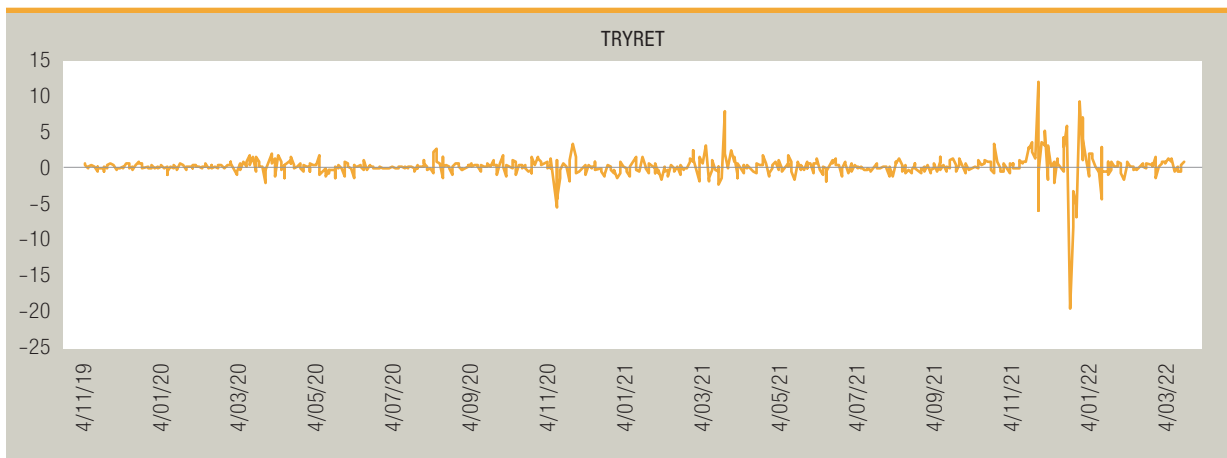


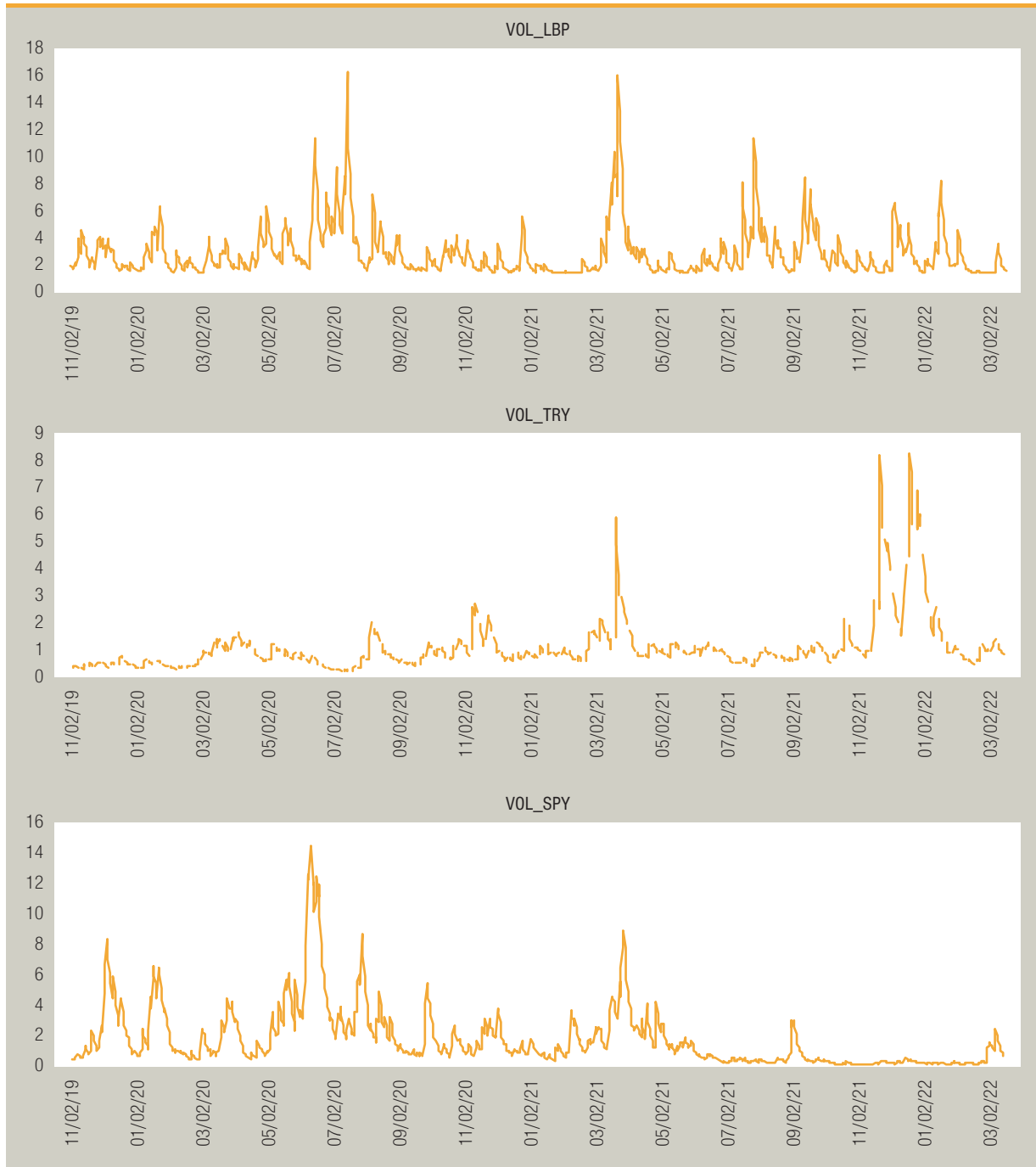
FIGURE 53 • Returns on the TRY



This decision was followed by a deposit scheme, announced by Turkey's President Recep Tayyip Erdogan on December 20, that aimed to protect the purchasing power of deposits in TRY, shore up confidence

in the TRY, provide an impetus for the de-dollarization of deposits, and stem the TRY's depreciation. The TRY appreciated as a result of Erdogan's announcement, although the appreciation was short-lived.

FIGURE 54 • Volatility of LBP, SYP and LBP

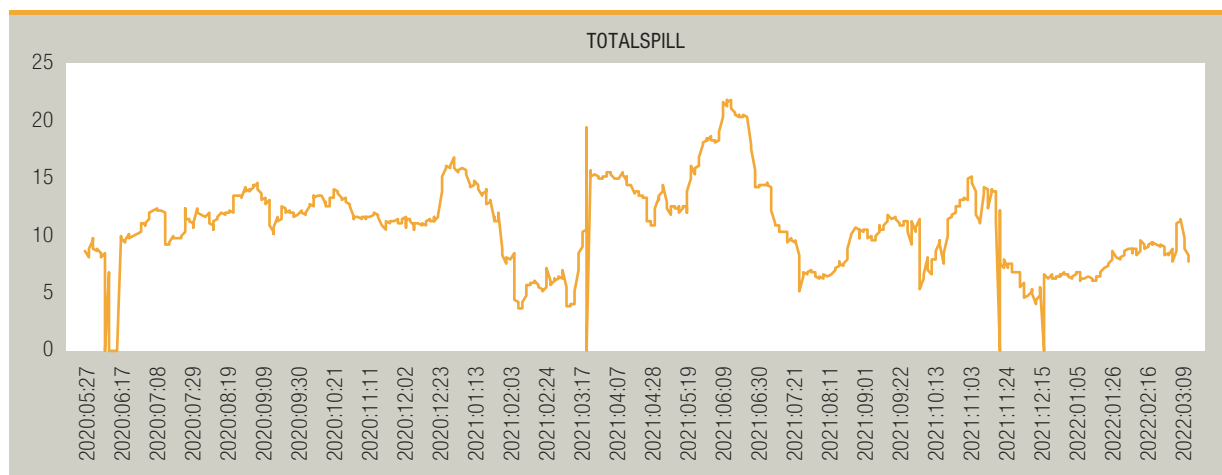


The GARCH(1,1) model for the TRY is explosive, likely due to the large movements (i.e., appreciation and depreciation relative to the US dollar) in the TRY in November and December of 2021. Therefore, the volatility of the TRY is estimated using an Exponential GARCH (1,1) model.

The volatilities of the LBP, TRY, and SYP are provided in Figure 54.

Figure 54 suggests the absence of strong commonalities between the volatilities of the TRY, SYP, and LBP. Indeed, the commonality in volatility between SYP and LBP is stronger than the

FIGURE 55 • Total Volatility Spillover Index: LBP, SYP and TRY



commonalities among the volatility of TRY and LBP or TRY and SYP.

The total volatility spillover index is provided in Figure 55.

The total volatility spillover index exhibits similar dynamics to that in Figure 51. More specifically, the index is at a maximum of 21.94 percent on June 15, 2021.

The directional volatility spillover analysis, provided in Figure 56, suggest that directional spillovers from TRY were the highest in November and December 2021. The increase in the total spillover index toward the end of 2021 can be ascribed to the increase in the directional spillover from the TRY.

In contrast, at the onset of the Lebanese financial crisis and in early 2022, the directional spillovers from the LBP were high, while the directional spillovers from the SYP were elevated in summer 2021. The directional spillovers from SYP and LBP appear to have a larger bearing on the total volatility spillover index than directional spillovers from TRY. The latter dynamics of the volatility spillovers between the SYP and LBP are similar to those uncovered when the analysis was carried out with only LBP and SYP earlier. This suggests that the link (in volatility) between SYP and LBP is tighter than the link between TRY and the latter two currencies.

Summary and interpretation of the findings

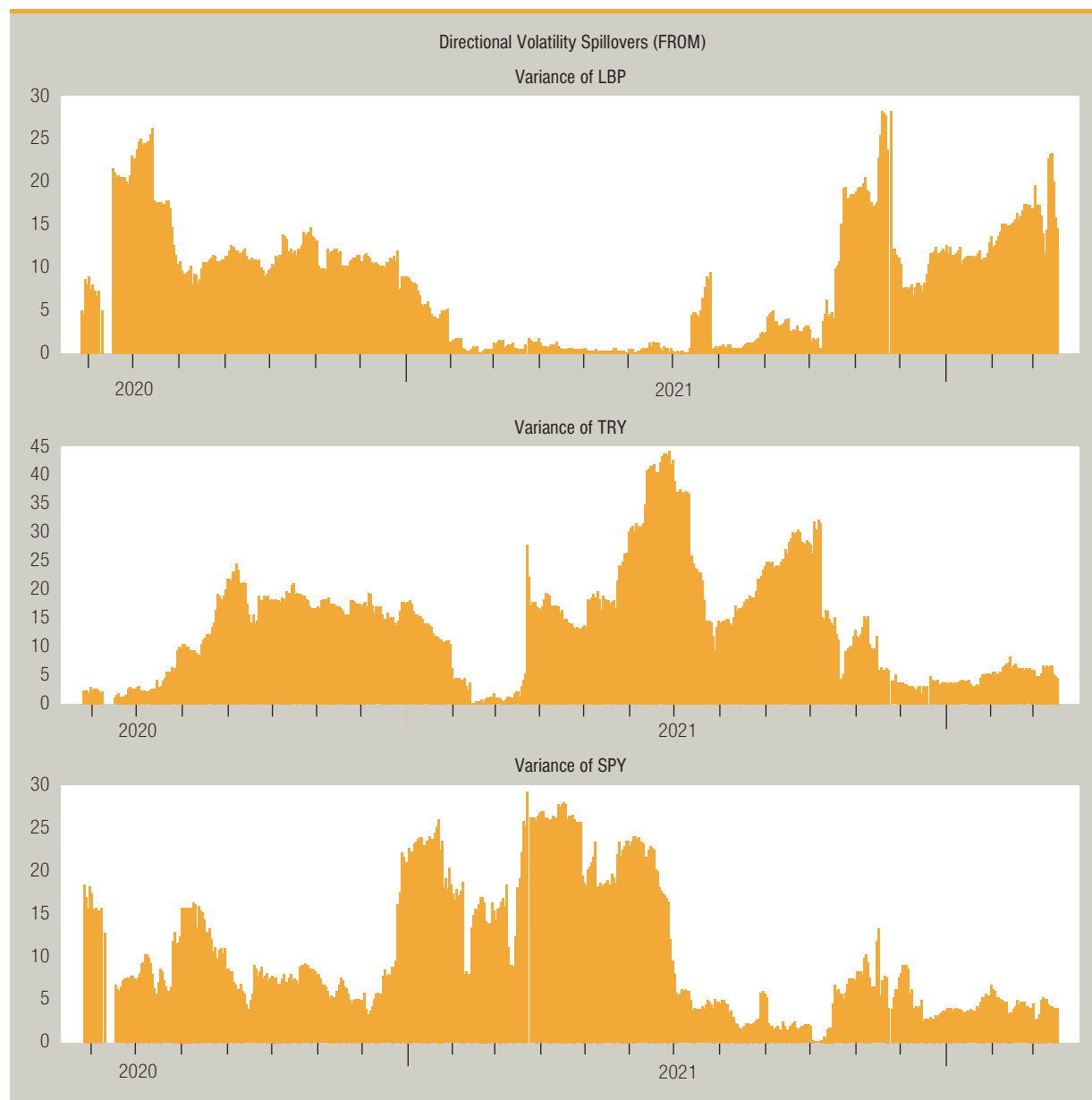
The findings indicate that there are commonalities in the movements and volatilities of the SYP and LBP.

More specifically, following the onset of Lebanon's financial crisis in late 2019, the correlation between the movements of the two currencies increased. The correlation also increased in the summer of 2021 and in early 2022. However, there appeared to be a decoupling in the movements and volatilities of the two currencies in the wake of the termination of the subsidy scheme in Lebanon in September 2021. The pattern in the volatility spillovers mimics that of the correlation in the two currencies. There is a marked increase in volatility spillovers at the onset of the Lebanese financial crisis in October and November of 2019 and during the summer of 2021, and spillovers in volatility are increasing in early 2022. Moreover, the findings suggest a greater degree of connectedness between SYP and LBP than between any of the latter two currencies and TRY.

The close commercial and trade ties between Lebanon and Syria as well as Syrians' reliance on Lebanese banks for their commercial and personal activities explain the tight link between the Syrian and Lebanese pounds prior to July 2021. Further, Syrian businesses' reported use of the Lebanese black market to obtain US dollars and avert sanctions under the Caesar Act, coupled with the smuggling of subsidized goods, gasoline, and diesel from Lebanon to Syria, have created exchange rate market pressures and simultaneous demand for US dollars in Syria and Lebanon. This, in turn, led to a tightening in the link between the two currencies.

The link between the two currencies weakened after September 2021, the date of the termination

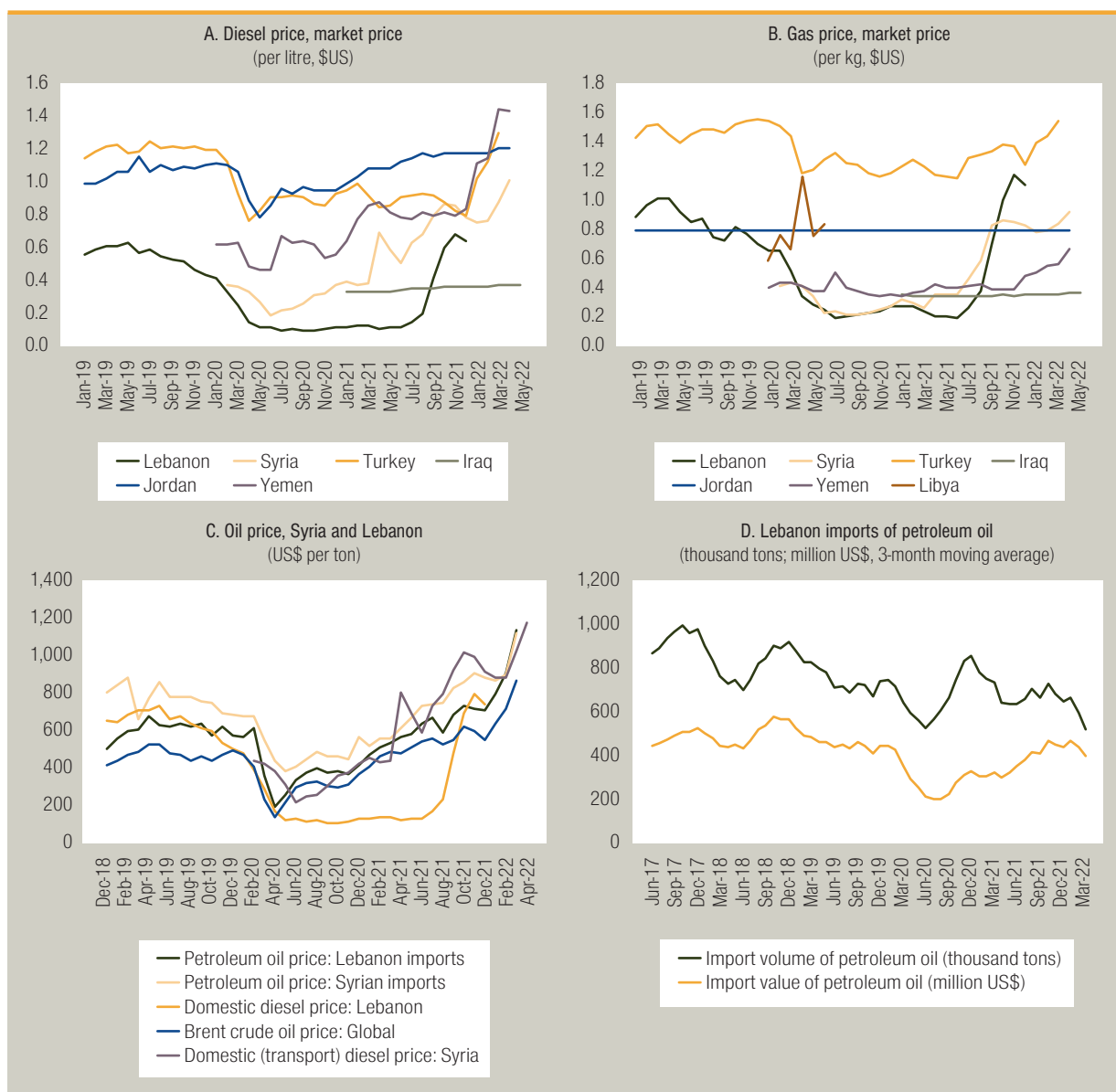
FIGURE 56 • Directional Volatility Spillovers: LBP, SYP and TRY



of subsidies in Lebanon, which indicates the easing of simultaneous exchange market pressures. This apparent decoupling in the movement of the two currencies is likely to be explained by the lower demand in Syria to purchase the smuggled subsidized goods, gasoline, and diesel from Lebanon after the termination of subsidies. Indeed, following the termination of subsidies, purchasing these goods in Lebanon and selling them in Syria would not have been less profitable.

Indeed, owing to the subsidies that were terminated only in September 2021, the prices of diesel and gasoline in Lebanon were the lowest among the comparators, which are Syria, Iraq, Turkey, Yemen, Libya, and Jordan, some of which are fuel-rich countries (Figure 57.A, B and C). This created a strong incentive for smuggling, particularly given that the centers of economic activity in Syria are close to the Lebanese border. The smuggling hypothesis is supported by evidence that Lebanon has imported a large volume

FIGURE 57 • Gasoline and Diesel Prices in Lebanon are among the Very Lowest in the Region in the pre-Subsidy Termination Era



of oil derivatives before the termination of subsidies (Figure 57.D).

The less precipitous depreciation (and lower volatility) in the Syrian pound since mid-2021 is likely to be attributable to the import restrictions that were imposed by the Syrian authorities. These policies, which restrict the imports of non-essential goods, aimed at restricting the use of the limited foreign currency reserves to essential food imports and thereby decelerate their depletion. Estimates from the maritime

data suggest that these policies were implemented successfully. Indeed, Syria's import volume has more than halved from 2019 to 2021. Further, the Syrian authorities have drastically reduced the list of critical goods that are imported at the preferential exchange rates, leading to lower margins of profitability for importers and, hence, a diminished incentive to import. The import-restriction policies also likely contributed to the lower volatility of the SYP and to the decoupling between the SYP and LBP since September 2021.

Average Exchange Rates for Syria

Introduction

A multiple exchange rate system exists in Syria. More specifically, two prevailing exchange rates are the Central Bank of Syria (or official) and market exchange rates. The official exchange rate is used for: (i) the state budget and public sector transactions; (ii) money transfers from abroad through the official channels; (iii) fees paid by Syrian men seeking to avoid mandatory military service; (iv) international aid operations; and (v) imports of critical commodities such as sugar, rice, vegetable oil, and selected medical products. In contrast, the market exchange rate is applied when private funds are transferred into Syria through the unofficial channels. Imports of non-critical goods also apply the market exchange rates.

There are other exchange rates in Syria⁷¹. This includes “the banks and financial institutions” rate, which is used by private banks and financial institutions to conduct transactions, including financing imports and exports of the private sector; the “remittance” rate, which was set by the CBS in April 2013 and is used by Syrians sending money from abroad; the “United Nations” rate, which was set by the CBS in December 2011 and is used by UN agencies operating in Syria; the “military service exemption rate”, which is for Syrian men who want to pay the required fee to be exempted from the mandatory military service. The CBS also issues a customs and airline transactions rate in May 2021. These rates are either close to the official exchange rates, or they are between the official and market exchange rates.

Consumption basket

The note uses consumption-based weights to estimate the average exchange rate in Syria.

We adopt the following nomenclature:

- C_g denotes share of goods in the consumption basket;
- C_s denotes share of services in the consumption basket;
- C_g^m denotes ratio of imported goods to total goods in the consumption basket;

- C_s^m denotes ratio of imported services to total services in the consumption basket.

C_g and C_s are derived from the weights for different components in the Consumer Price Index (CPI). Specifically, C_s is calculated by summing up the weights of CPI components that are assumed to be consumption of services.⁷² Remaining components in the CPI are assumed to be consumption of goods. The weights of CPI components change through time. According to the latest data from the Central Bureau of Statistics, in 2020:

$$C_s = 26\%$$
$$C_g = 1 - C_s = 74\% \text{ } ^{73}$$

We assume that 80 percent of goods in the consumption basket are imported, whereas only 40 percent of services in the consumption basket are imported. Hence,

$$C_g^m = 80\%$$
$$C_s^m = 40\%$$

We assume C_g^m and C_s^m remain unchanged throughout the conflict period.

Categories of imports

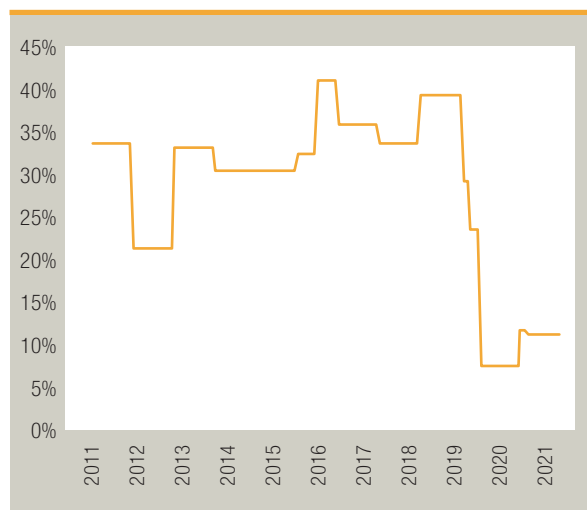
There are two categories of imported goods and services, critical and others:

⁷¹ The Syria Report, “Syrian Pound Exchange Rates – Central Bank of Syria and Black Market”, (March 31, 2022).

⁷² Components that are assumed to be focused on the consumption of services and their associated weights are: Dwelling Maintenance and Repair (1.254 percent), Goods and Services for Household Maintenance (1.845 percent); Health (3.821 percent); Transportation (7.056 percent); Communication (4.245%); Recreation and culture (0.953 percent); Education (1.556 percent); Restaurant and hotels (2.071 percent); Miscellaneous Goods and Services (3.348 percent); and Non-Profit Institutions Serving Households (0.002 percent).

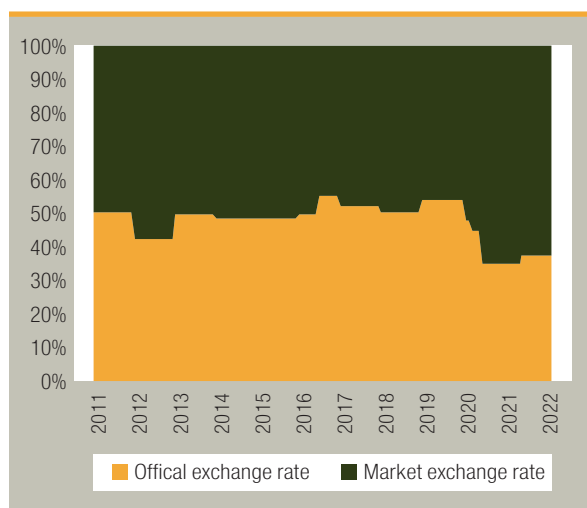
⁷³ While the components that are assumed to be focused on the consumption of services also includes goods (i.e., communications), we can assume that this is offset by components that are assumed to be focused on the consumption of goods but that also include services.

FIGURE 58 • Share of Critical Goods Imports in Syria
(Share in percent)



Source: UN Comtrade database; World Bank staff estimates.

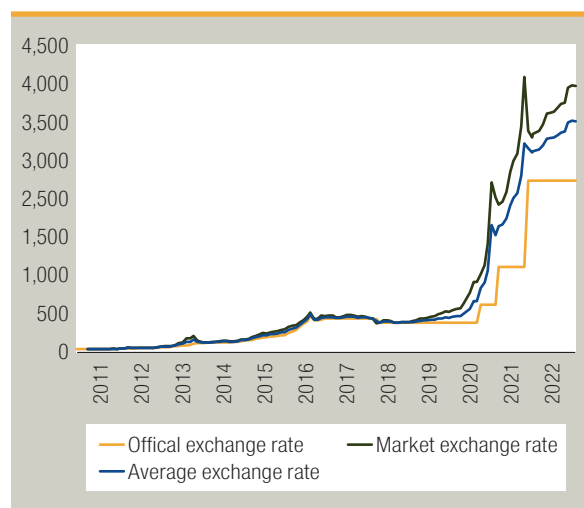
FIGURE 59 • Weight Structure of the Average Exchange Rate
(Share in percent)



Source: Syrian Pound Today for market exchange rate; Central Bank of Syria for official exchange rate; UN Comtrade database for calculation of critical imports that are imported at the official exchange rate; Central Bureau of Statistics for CPI weights in Syria; World Bank staff estimates.

- Imports of critical goods imports apply the preferential (or the official) exchange rate (E^o);
- Other goods imports, and all services imports, are traded at the market exchange rate (E^m);
- M_g^c denotes the ratio of the value of critical goods imported as a proportion of the value of total goods imports.

FIGURE 60 • Average Exchange Rate in Syria
(SYP/USD)



Source: Syrian Pound Today; Central Bank of Syria; UN Comtrade database; Central Bureau of Statistics; World Bank staff estimates.

Before 2019, the list of critical goods did not change significantly. Some major policy moves include the period from 2012–2013, when the authorities tightened imports to save scarce foreign reserves, and inputs for strategic industries, such as textiles, rubber, and chemicals, were excluded from the list. In 2016, some food items were excluded from the list of critical goods, such as meat, fish, and cereal. However, a few non-food items were added back on the list, such as textiles, yarns, and plastic, in addition to a few pharmaceutical and medical products.

Owing to severe foreign currency shortages, the authorities have vastly reduced the list of critical goods that are imported, applying the preferential exchange rates since 2019. More specifically, the authorities announced the prioritization of only a limited number of food commodities and medicine in imports in August 2019. In mid-2020, a few more food items were excluded from the list. Nevertheless, the list of critical imports was expanded in 2021 to include more food items in an effort to mitigate the negative impact of price increases and food shortages on citizens.

We apply the mirror statistics from the UN Comtrade database to estimate imports of goods and services by the 4-digit Standard International Trade Classification (SITC). The share of the imports of critical goods M_g^c in Syria from 2011–2020 is estimated as follows:

Categories of imports

We assumed that domestic produced components all apply to the official exchange rate. This stems from the fact that key contracted prices, such as wages, rents, university and school tuition, and services continue to apply the official exchange rate.

Using the above assumptions that 80 percent of goods in the consumption basket are imported, whereas only 40 percent of services in the consumption basket are imported, the share of transactions that applies the market exchange rate, is thus:

$$R^m = C_s * 40\% + C_g * 80\% (1 - M_g^c)$$

The consumption-based average exchange rate (AER) can be calculated as follows:

$$AER = R^m * E^m + (1 - R^m) * E^o$$

The Exchange Rate Pass-Through in Syria

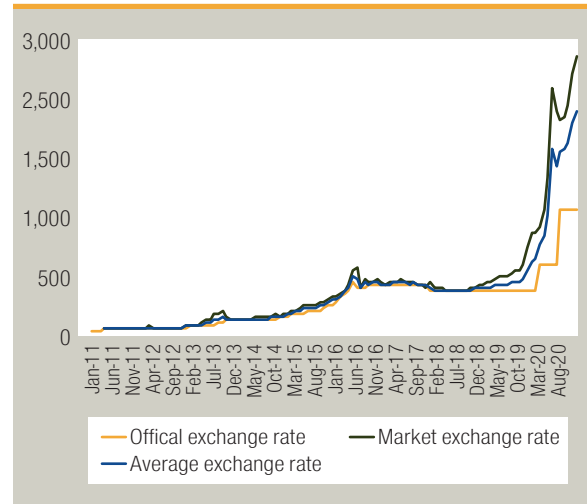
Introduction

The exchange rate pass-through measures the extent to which fluctuations in the exchange rate leads to changes in aggregate prices (i.e., inflation). The Exchange Rate Pass-Through (ERPT) coefficient is, therefore, akin to an elasticity coefficient, in that it measures the sensitivity of the Consumer Price Index (CPI) to the exchange rate.

As described in the previous note, a multiple exchange rate system exists in Syria. More specifically, the two prevailing exchange rates are the Central Bank of Syria (or official) and market exchange rates.

The official exchange rate is not employed in the empirical analysis, given that it does not exhibit variation in the post-2016 period (Figure 61). The market and average exchange rates are employed in the empirical analysis. The latter is computed in the same manner as Lebanon's Average Exchange Rate (AER). That is, the AER uses the consumption-based weights derived from the weights of the consumption basket in the CPI. The time series dynamics of the three exchange rates are provided in Figure 61.

FIGURE 61 • Time Series Dynamics of the Official, Market and Average Exchange Rates



Direct approach to computing the ERPT

The simplest approach to gauging the ERPT is to estimate the change in the CPI , ΔCPI_t , which is due to a change in the exchange rate, ΔE_t . Estimates of the contemporaneous response of the changes in price level to changes in the exchange rate, $\Delta CPI_t / \Delta E_t$, or to lagged changes in the exchange rate, $\Delta CPI_t / \Delta E_{t-1}, \Delta CPI_t / \Delta E_{t-2}$.

Table 11 provides the estimates of the various pass-through coefficients estimated using data for the period May 2011 to December 2020.

These estimates are subject to considerable uncertainty as evinced the high standard deviation. In fact, the standard deviation of each of these estimates is very large.

Estimates the ERPT coefficient can also be obtained from more elaborate econometric models. The existing literature commonly employs well-specified Vector Autoregressive (VAR) models to gauge the response of prices to an exchange rate shock. The advantage of the latter approach is to allow for discerning the effects of exchange rate fluctuations on inflation over several horizons (one, six, or 12 months).

Existing research also employs a direct method for estimating the ERPT coefficient using regression analysis. Studies that use standard pass-through regressions include Jašová, Moessner, and Takáts

TABLE 11 • Estimates of the Exchange Rate Pass-Through Using the Simple Approach

	Average exchange rate		Market exchange rate	
	Average	Standard Deviation	Average	Standard Deviation
$\Delta CPI_t / \Delta E_t$	65.53	302.63	73.53	273.57
$\Delta CPI_t / \Delta E_t$	79.56	437.14	30.69	357.54

(2019), Bailliu and Fujii, (2004), Bussiere (2013), Ben Cheikh and Rault (2016), and Ihrig, Marazzi, and Rothenberg (2006), among others.

This note will employ the two approaches to gauging the ERPT.⁷⁴ It is worth noting that differences in the results between the pass-through regression and the VAR approach are to be expected at the outset. In fact, when the VAR approach is used, the pass-through effect is computed from Impulse Response Functions, which are non-linear functions of the VAR's parameters (or more specifically, the Vector Moving Average representation's coefficients). In contrast, the pass-through regressions are linear. Hence, some differences in the results are to be expected.

Estimating the ERPT coefficient with a VAR

Existing studies commonly employ Vector Autoregressive (VAR) or Vector Error Correction (VECM) models to gauge the degree of the pass-through from the exchange rate to inflation (Bhundia, 2002; Ha, Stocker and Yilmazkuday, 2019; McCarthy, 2007; Korhonen and Wachtel, 2006;; Leigh and Rossi, 2002; McCarthy, 2007). All of the latter studies estimate the ERPT coefficient using impulse response analysis from a well-specified model. The extent to which exchange rate (or devaluation/depreciation) shocks drive inflation is also examined using forecast error variance decompositions.

VAR in differences

The first approach to estimating the ERPT coefficient is to specify and estimate a VAR model. A VAR relates a ($k \times 1$) vector of variables, Y_t , to p of its own lags. A structural VAR model is given by:

$$B_0 y_t = B_1 y_{t-1} + \dots + B_p y_{t-p} + \omega_t, \quad (1)$$

The VAR model in reduced form can be written as:

$$y_t = B_0^{-1} B_1 y_{t-1} + \dots + B_0^{-1} B_p y_{t-p} + B_0^{-1} \omega_t, \quad (2)$$

That is, the reduced form residuals relate to the structural residuals via: $u_t = B_0^{-1} \omega_t$.

The vector of variable y_t includes the logarithmic change in commodity prices, the exchange rate, and inflation, as measured by changes in the Consumer Price Index (CPI).

Let P_t^c , E_t , and P_t denote, respectively, the levels of the commodity prices, as proxied for using the S&P GSCI index,⁷⁵ the exchange rate, measured as the market or average exchange rate, as well as the CPI.

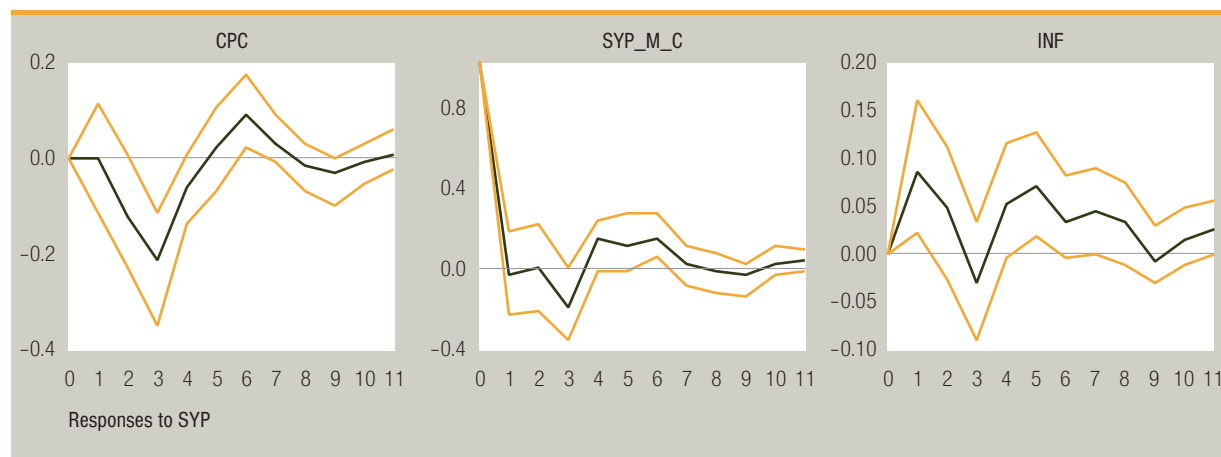
The vector of variables used in the VAR is p_t^c , e_t , and p_t which denote the natural logarithm of the variables.

That is, the VAR comprises the variables $y_t = [\Delta p_t^c, \Delta e_t, \Delta p_t]$ and is estimated using a recursive ordering (i.e., Cholesky). The VAR model is estimated using the logarithmic change in the variables to circumvent possible non-stationarity, and the optimal number of lags is selected using the Bayesian Information Criterion (BIC). The sample period is May 2001 to December 2020 (accounting for lags) and the analysis is carried out at the monthly frequency. The VAR is estimated using the market and average exchange rates.

⁷⁴ For a discussion of other methodologies to estimating the ERPT, see Jiménez-Rodríguez and Morales-Zumaquero (2016). Ortega and Osbat (2020) offer an excellent review of the literature on the exchange rate pass-through.

⁷⁵ Data on the S&P GSCI and Bloomberg indexes are collected from Datastream. Only the S&P GSCI data are used, given the high correlation between the two commodity indexes. Monthly observations are obtained from daily data by averaging the daily observations.

FIGURE 62 • Response to a 1% Shock in the Change in the SYP



The impulse responses and Forecast Error Variance Decompositions (FEVDs) for inflation are provided in Figures 62 and 63, respectively.

The Impulse Response Functions (IRFs) in Figure 62 show that inflation responds significantly to a shock in the SYP and that the response of inflation peaks one month following the shock. The FEVD also suggests that the change in the SYP is an important driver of changes in the variance of inflation.

The pass-through coefficient (Leigh and Rossi, 2002) or, more precisely, the Price-to-Exchange Ratio (PERR) coefficient is computed as (Ortega and Osbat, 2020):

$$PT_{t,t+j} = P_{t,t+j} / E_{t,t+j}, \quad (3)$$

where $PT_{t,t+j}$ and $E_{t,t+j}$ are, respectively, the cumulative changes in the price level and the exchange rate between months t and $t+j$. The PERR is provided in Figure 63.

The cumulative effect, over a horizon of twelve months, of the exchange rate shock on inflation, which can be interpreted as the pass-through, is reported in Table 12.

VAR in log level

In order to assess the robustness of the results, a VAR in levels is estimated. In fact, the VAR in differences will be misspecified in the presence of a cointegrating relation between the variables. This is possible, given that the variables are integrated of order one (i.e.,

FIGURE 63 • Forecast Error Decomposition for Inflation

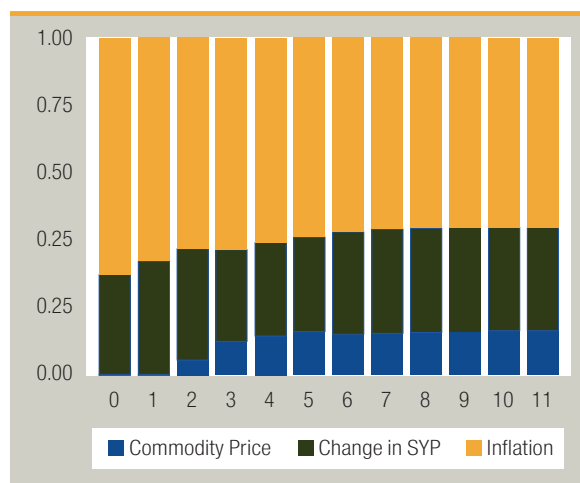


TABLE 12 • Cumulative Effect of an Exchange Rate Depreciation

Panel A: Market Rate	
Change in Exchange Rate	Change in Inflation
1%	0.42%
100%	42%
Panel B: Average Exchange Rate	
1%	0.47%
100%	47%

nonstationary) and may have a common stochastic trend (i.e., may be cointegrated) (Figure 62).

FIGURE 64 • The Price to Exchange Ratio

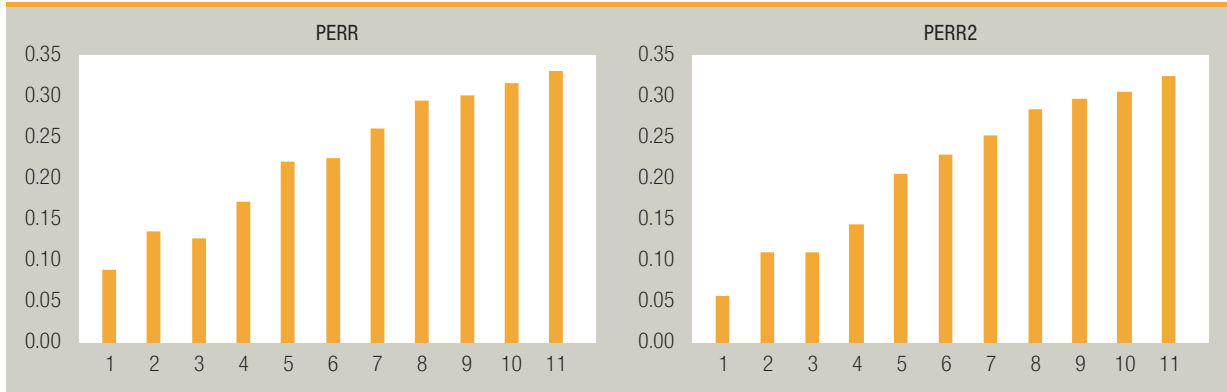
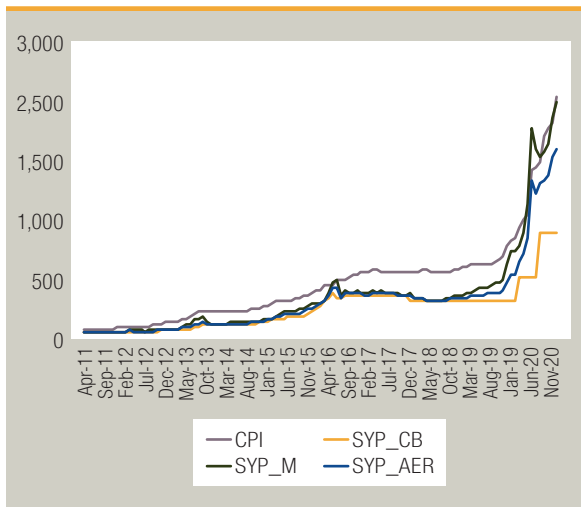


FIGURE 65 • Exchange Rates and the CPI



Therefore, estimating the VAR in levels and testing for cointegration is necessary.

Starting from a VAR in log levels as a data generating process:

$$Y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t, \quad (3)$$

The Vector Error Correction Model (VECM) representation can be obtained by subtracting y_{t-1} from the two sides of the equation:

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \dots + \Gamma_p \Delta y_{t-p+1} + u_t, \quad (4)$$

where

$$\Pi = -(I_k - A_1 - \dots - A_p) \text{ and } \Gamma_i = -(A_{i+1} + \dots + A_p) \text{ for } i = 1, \dots, p-1$$

Johansen (1988) proposes testing for the existence of a long-run cointegrating relation by examining the rank of matrix Π . The rank of Π will not be significantly different from zero if the variables are not cointegrated.

The presence of a cointegration relation in the VAR in log levels is tested using the Johansen (1988) approach. More specifically, the existence of cointegrating vectors can be examined using the trace statistic:

$$\lambda_{\text{trace}}(r) = -T \sum_{i=r+1}^g \ln(1 - \hat{\lambda}_i), \quad (5)$$

where r is the number of cointegrating vectors under the null hypothesis and $\hat{\lambda}_i$ is the estimated i^{th} ordered eigenvalue of the matrix Π . The trace statistic tests the null hypothesis that the number of cointegrating vectors is r or less against the alternative hypothesis that there are more than r cointegrating vectors.

The trace statistic, as well as the Phillips and Ouliaris (1990) cointegration test suggest the absence of a cointegrating relation. Therefore, the VAR is estimated in log levels.

The results from estimating the VAR in log levels are provided in Table 13.

Standard pass-through regressions

The standard pass-through regression: first specification

The second approach consists of using the standard pass-through regressions (Gopinath, Itskhoki, and Rigobon, 2010):

TABLE 13 • Cumulative Effect of an Exchange Rate Depreciation

Panel A: Market Rate	
Change in Exchange Rate	Change in Inflation
1%	0.30%
100%	30%
Panel B: Average Exchange Rate	
1%	0.35%
100%	35%

$$\Delta p_t = a + \sum_{j=0}^n \beta_j \Delta e_{t-1} + \sum_{j=0}^n \gamma_j \Delta p_{t-j}^f + \sum_{j=0}^3 \delta_j \Delta p_{t-j}^{com} + \varepsilon_t \quad (6)$$

where p is the CPI in Syria, e is the exchange rate quoted as units of SYP per US\$, p_t^f is the foreign price level proxied for using the CPI of the United States and p_t^{com} is a commodity price index. As noted in Gopinath, Itskhoki, and Rigobon (2010), the statistic of interest, which measures the effect of changes in the exchange rate on inflation, is $\beta(n) \equiv \sum_{j=0}^n \beta_j$. Equation (6) is estimated with $n = 12$ and using data for the period May 2012 to December 2021 (accounting for lags).⁷⁶

The above regression is a modified version of Gopinath, Itskhoki, and Rigobon (2010)'s pass-through regression, and variants of it have been employed in the literature to measure the ERPT coefficient (Bailliu and Fujii, 2004; Bussiere, 2013, among others).

When the market rate is employed, the results show that $\beta(12) = 0.84$. When the AER is employed, the results suggest that $\beta(12) = 0.79$. While the coefficient associated with the contemporaneous change in the exchange rate, β_0 , is in line with the results of the VAR, the latter pass-through effects are larger than those suggested by the VAR.

Figure 66 provides time-varying estimates of β_0 obtained from rolling regressions.

The time-varying estimates suggest that the contemporaneous effect of the exchange rate on inflation increased markedly since 2019. This increase is

⁷⁶ The data are the same as those used for estimating the VAR models. More specifically, the sample spans the period May 2011 to December 2020. The sample reported in the text accounts for missing observations due to lags.

TABLE 14 • Pass-Through Regressions: Estimation Results

	Market Rate	AER
Constant	-2.093 (1.307)	-0.976 (1.260)
Contemporaneous Exchange Rate Change	0.237*** (0.062)	0.346*** (0.077)
First Lag of Exchange Rate Change	0.088** (0.042)	0.077* (0.045)
Second Lag of Exchange Rate Change	0.055** (0.029)	0.051 (0.044)
Third Lag of Exchange Rate Change	0.165*** (0.031)	0.203*** (0.040)
Fourth Lag of Exchange Rate Change	0.072*** (0.023)	0.036 (0.031)
Fifth Lag of Exchange Rate Change	-0.029 (0.022)	-0.078** (0.030)
Sixth Lag of Exchange Rate Change	0.121*** (0.030)	0.135*** (0.043)
Seventh Lag of Exchange Rate Change	0.072*** (0.024)	0.085** (0.034)
Eighth Lag of Exchange Rate Change	-0.025 (0.025)	-0.069 (0.042)
Ninth Lag of Exchange Rate Change	0.050 (0.034)	0.034 (0.048)
Tenth Lag of Exchange Rate Change	0.054** (0.027)	0.070** (0.034)
Eleventh Lag of Exchange Rate Change	-0.038 (0.023)	-0.081* (0.041)
Twelfth Lag of Exchange Rate Change	0.018 (0.027)	-0.014 (0.041)
Contemporaneous US Inflation	0.771 (2.512)	-0.709 (2.411)
First Lag of US Inflation	7.329*** (2.735)	6.295** (2.469)
Second Lag of US Inflation	(2.663) -2.173	-2.066 (2.218)
Third Lag of US Inflation	-0.267 (2.900)	-1.433 (2.830)
Fourth Lag of US Inflation	5.632*** (2.019)	5.574*** (1.941)
Fifth Lag of US Inflation	-1.547 (1.818)	-0.850 (1.615)
Sixth Lag of US Inflation	1.978 (1.247)	1.447 (1.063)
Seventh Lag of US Inflation	2.576* (1.337)	1.720 (1.266)

(continued on next page)

TABLE 14 • Pass-Through Regressions: Estimation Results (continued)

	Market Rate	AER
Eighth Lag of US Inflation	2.546 (1.705)	2.786* (1.457)
Ninth Lag of US Inflation	-1.177 (1.833)	-2.363 (1.500)
Tenth Lag of US Inflation	1.946 (1.595)	1.920 (1.619)
Eleventh Lag of US Inflation	0.365 (1.350)	0.453 (1.217)
Twelfth Lag of US Inflation	-1.909 (1.239)	-2.325* (1.242)
Contemporaneous Commodity Price Change	0.018 (0.053)	0.074 (0.051)
First Lag of Commodity Price Change	-0.071 (0.073)	-0.031 (0.069)
Second Lag of Commodity Price Change	-0.211** (0.097)	-0.169* (0.092)
Third Lag of Commodity Price Change	0.068 (0.090)	0.118 (0.097)

Notes: Newey and West (1987) Heteroskedasticity and Autocorrelation Consistent standard errors are in parentheses. *, **, *** denote, respectively, statistical significance at the 1%, 5% and 10% levels.

likely to be attributable to higher inflation expectations in Lebanon, owing to a sharp increase in currency

in circulation, which fed into inflation expectations in Syria.

Standard pass-through regression: second specification

A simpler specification of the standard pass-through regression is estimated:

$$\Delta p_t = a + \sum_{j=0}^n \beta_j \Delta e_{t-j} + \sum_{j=0}^3 \delta_j \Delta p_{t-j}^{com} + \varepsilon_t, \quad (7)$$

Equation (7) excludes US inflation, which brings it closer to the specification used in the VAR. When the market rate is employed, the results show that $\beta(12) = 0.70$. When the AER is employed, the results suggest that $\beta(12) = 0.69$. Figure 65 provides the time-varying estimates of the coefficient beta zero.

In order to better track the variation in the contemporaneous pass-through coefficient, we plot the time-variation in the coefficient beta zero from the simplest possible specification:

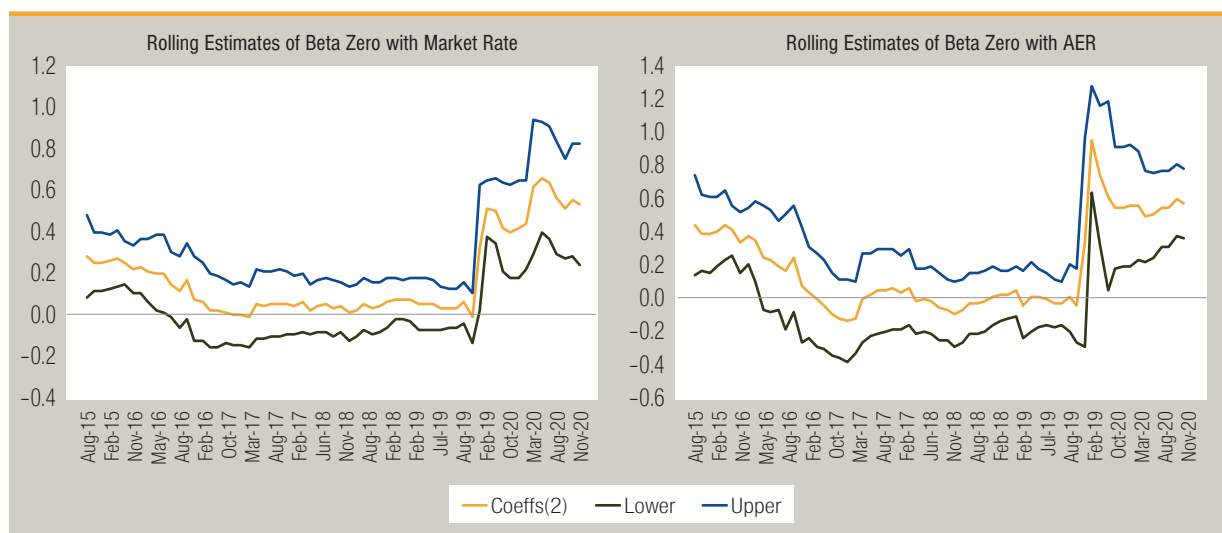
$$\Delta p_t = a + \beta_0 \Delta e_t + \varepsilon_t, \quad (8)$$

The results are provided in Figure 68.

Summary

The results suggest that a depreciation of 100 percent in the SYP increases inflation by 30 to 84 percent.

FIGURE 66 • Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation



Notes: This figure provides rolling estimates of the contemporaneous effect of the exchange rate on inflation. The 95% confidence bands are in blue.

FIGURE 67 • Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation from the Second Specification

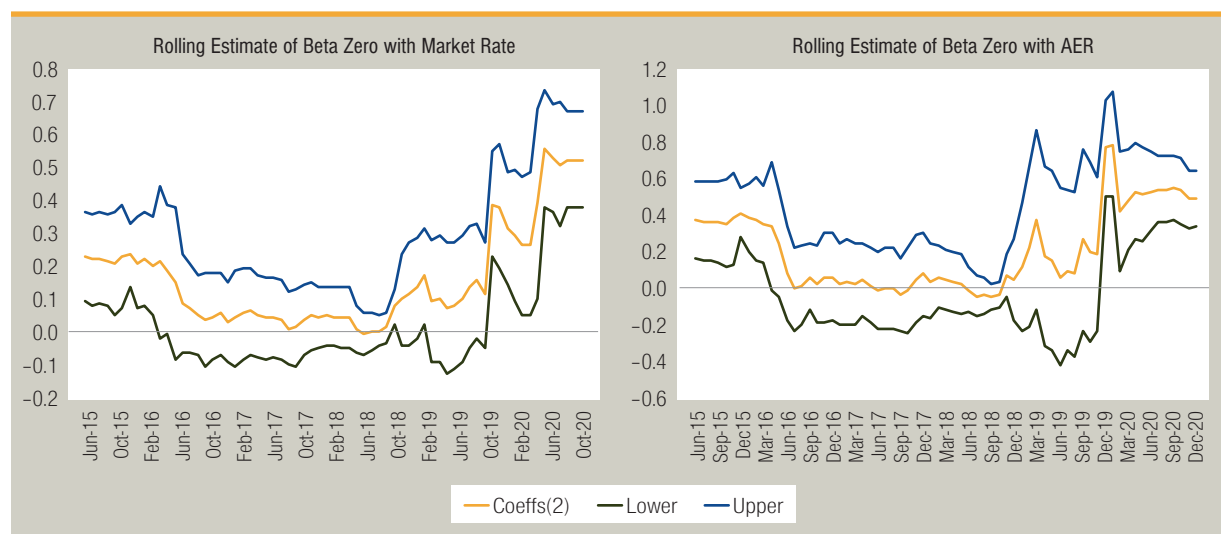
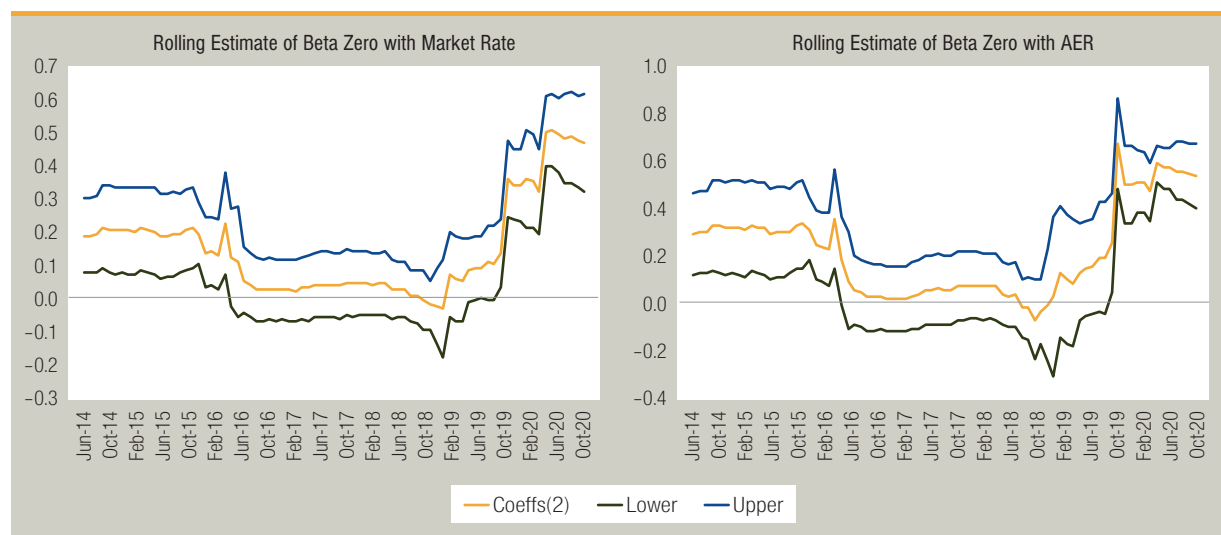


FIGURE 68 • Rolling Estimates of the Contemporaneous Effect of the Exchange Rate on Inflation from the Third Specification



Therefore, the pass-through effect in Syria is high. The ERPT coefficient appears to have increased significantly following the onset of the Lebanon financial crisis in October 2019. In fact, the upward trend in the ERPT since October 2019 is clearly discernable (in Figures 63, 64 and 65).

The ERPT coefficient for Syria can be placed in context by benchmarking it to the findings of the literature for the other countries. For instance, Jiménez-Rodríguez and Morales-Zumaquero (2016)

report short and long-run ERPT coefficients for the G7 countries that range from -0.0138 to 0.00179 .⁷⁷ Admittedly, a better assessment of the degree of the pass-through in Syria would entail comparing the ERPT coefficient for Syria to that of developing economies or emerging markets using comparable

⁷⁷ The pass-through effect reported by Ihrig, Marazzi, and Rothenberg (2006) for the Group of Seven (G7) is of a comparable magnitude.

techniques. Jašová , Moessner, and Takáts (2019) estimate the ERPT in the post-2008 crisis using data for a panel of developed and emerging market economies and Generalized Method of Moments (GMM) estimation of a hybrid New Keynesian Phillips curve. The authors document that the pass-through effect declined for emerging market economies following the 2008 financial crisis. More specifically, Jašová , Moessner, and Takáts (2019) estimate a yearly pass-through coefficient of 0.222 to 0.231 for the emerging market economies.

Ca'Zorzi, Hahn, and Sánchez (2007) gauge the pass-through by accumulating the responses of consumer prices to 1 percent exchange rate shock from a well-specified VAR. Therefore, their results are directly comparable to the results obtained from the VAR for Syria. At a horizon of 12 months, the pass-through effect for Syria is larger than that reported for China, Hong Kong, Korea, Singapore, Taiwan, Turkey, Poland, Chile, and Argentina in Table 14 of Ca'Zorzi, Hahn, and Sánchez (2007). Only the Czech Republic, Hungary, and Mexico exhibit a higher exchange rate pass-through.



REFERENCES

- Abadie, A., A. Diamond, and J. Hainmueller. 2015. "Comparative Politics and the Synthetic Control Method." *American Journal of Political Science* 59 (2): 495–510.
- Abadie, A., A. Diamond, and J. Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105 (490): 493–505.
- Abadie, A., and J. Gardeazabal. 2003. "The Economic Costs of Conflict: A Case Study of the Basque Country." *American Economic Review* 93 (1): 113–132.
- Abbara, A., K. Blanchet, Z. Sahloul, F. Fouad, et al. 2015. "The Effect of the Conflict on Syria's Health System and Human Resources for Health." *World Health & Population* 16 (1): 87–95.
- Adhikari, B., R. A. Duval, B. Hu, and P. Loungani. 2016. "Can Reform Waves Turn the Tide? Some Case Studies Using the Synthetic Control Method." IMF Working Paper 16/171, International Monetary Fund, Washington, DC.
- al-Aswad, H. 2022. "Syria: Protests Mount Amid Anger Over 'Unfair' Cuts to Government Subsidies." *Middle East Eye*, February 12, 2022. <https://www.middleeasteye.net/news/syria-sweida-anger-mount-protests-cuts-government-subsidies>.
- Alesina, A., S. Michalopoulos, and E. Papaioannou. 2016. "Ethnic Inequality." *Journal of Political Economy* 124 (2): 428–488.
- Arezki, R., and M. Brueckner. 2014. "Effects of International Food Price Shocks on Political Institutions in Low-income Countries: Evidence From an International Food Net-export Price Index." *World Development* 61 (C): 142–153.
- Bailliu, J., and E. Fujii. 2004. "Exchange Rate Pass-Through and the Inflation Environment in Industrialized Countries: An Empirical Investigation." Working Paper 2004–21, Bank of Canada, Ottawa.
- Basihos, S. 2016. "Nightlights As a Development Indicator: The Estimation of Gross Provincial Product (GPP) in Turkey." <http://dx.doi.org/10.2139/ssrn.2885518>.

- Bellemare, M. F. 2015. "Rising Food Prices, Food Price Volatility, and Social Unrest." *American Journal of Agricultural Economics* 97 (1): 1–21.
- Ben Cheikh, N., and C. Rault. 2016. "The Pass-Through of Exchange Rate in the Context of the European Sovereign Debt Crisis." *International Journal of Finance & Economics* 21 (2): 154–166.
- Beyer, R., E. Chhabra, V. Galdo, and M. Rama. 2018. "Measuring Districts' Monthly Economic Activity From Outer Space." Policy Research Working Paper 8523, World Bank, Washington, DC.
- Beyer, R. C., S. Franco-Bedoya, and V. Galdo. 2021. "Examining the Economic Impact of COVID-19 in India Through Daily Electricity Consumption and Nighttime Light Intensity." *World Development* 140, 105287.
- Bhundia, A. 2002. "An Empirical Investigation of Exchange Rate Pass-Through in South Africa." IMF Working Paper WP/02/165, International Monetary Fund, Washington DC.
- Bussiere, M. 2013. "Exchange Rate Pass Through to Trade Prices: The Role of Nonlinearities and Asymmetries." *Oxford Bulletin of Economics and Statistics* 75 (5): 731–758.
- Ca' Zorzi, M., E. Hahn, and M. Sánchez. 2007. "Exchange Rate Pass-Through in Emerging Markets." ECB Working Paper No. 739, European Central Bank, Frankfurt.
- Campos, N. F., F. Coricelli, L. Moretti. 2019. "Institutional Integration and Economic Growth in Europe." *Journal of Monetary Economics* 103 88–104.
- Chadwick, V. 2022. "WFP Says Syrians at 'Breaking Point.'" Devex. May 12, 2022 <https://www.devex.com/news/wfp-says-syrians-at-breaking-point-103192>.
- Corral, P., A. Irwin, N. Krishnan, D. Gerszon Mahler, et al.. 2020 *Conflict and Fragility: On the Front Lines of the Fight Against Poverty*. Washington DC: World Bank.
- Croft, T. A. 1978. "Nighttime Images of the Earth From Space." *Scientific American* 239 (1): 86–101.
- Dagher, L., I. Jamali, and N. Badra. 2020. "The Predictive Power of Oil and Commodity Prices for Equity Markets." In *Risk Factors and Contagion in Commodity Markets and Stocks Markets*, edited by S. Goutte and K. Guesmi, chapter 3. Hackensack, NJ: World Scientific.
- Dagher, D. 2022. "Expelled from the Support System: Austerity Deepens in Syria." *Middle East Directions Programme Blog*. February 15, 2022. <https://blogs.eui.eu/medirections/expelled-from-the-support-system-austerity-deepens-in-syria/>.
- Devi, S. 2021. "Health in Syria: A Decade of Conflict." *The Lancet* 397 (10278): 955–956.
- Diebold, F. X., and K. Yilmaz. 2009. "Measuring Financial Asset Return and Volatility Spillovers, With Application to Global Equity Markets." *The Economic Journal* 119 (534): 158–171.
- Diebold, F.X., and K. Yilmaz, K. 2012. "Better to Give Than to Receive: Predictive Directional Measurement of Volatility Spillovers." *International Journal of Forecasting* 28 (1): 57–66.
- Doll, C. N., J. P. Muller, and J. G. Morley. 2006. "Mapping Regional Economic Activity From Night-time Light Satellite Imagery." *Ecological Economics* 57 (1): 75–92.
- Donaldson, D. and A. Storeygard. 2016. "The View From Above: Applications of Satellite Data in Economics." *Journal of Economic Perspectives* 30 (4): 171–98.
- Elvidge, C. D., K. E. Baugh, E. A. Kihn, H. W. Kroehl, et al. 1997. "Relation Between Satellite Observed Visible-near Infrared Emissions, Population, Economic Activity and Electric Power Consumption." *International Journal of Remote Sensing* 18 (6): 1373–1379.
- Elvidge, C. D., K. E. Baugh, M. Zhizhin, and F. C. Hsu. 2013. "Why VIIRS Data Are Superior to DMSP for Mapping Nighttime Lights." *Proceedings of the Asia-Pacific Advanced Network* 35: 62–69.
- Elvidge, C. D., T. Ghosh, F. C. Hsu., M. Zhizhin, et al. 2020. "The Dimming of Lights in China During the COVID-19 Pandemic." *Remote Sensing* 12 (17): 2851. <https://doi.org/10.3390/rs12172851>.
- ETANA Syria. 2022. "Syria Brief: Economic Crisis." March 8, 2022. Damascus. <https://etanasyria.org/syria-brief-economic-crisis-8-march-2022/>.
- FAO (Food and Agriculture Organization of the United Nations). 2021. *The State of Food Security and Nutrition in the World. Making Agrifood Systems More Resilient to Shocks and Stresses*. FAO.

- <https://www.fao.org/documents/card/en/c/cb4476en>.
- Ferroni, F., and F. Canova, 2022. "A Hitchhiker's Guide to Empirical Macro Models." Working Paper 2021-15, Federal Reserve Bank of Chicago, Chicago, IL.
- Fouad, F. M., A. Sparrow, A. Tarakji, M. Alameddine, F. et al. 2017. "Health Workers and the Weaponisation of Health Care in Syria: A Preliminary Inquiry for The Lancet – American University of Beirut Commission on Syria." *The Lancet* 390 (10111): 2516–2526.
- Gallegos, J. V. 2012. "The Effects of Civil Conflicts on Women's Labor Force Participation: A Causal Mechanism Approach." Institute of Development Studies, University of Sussex. Brighton, UK.
- Gibson, J., S. Olivia, G. Boe-Gibson, and C. Li. 2021. "Which Night Lights Data Should We Use in Economics, and Where?" *Journal of Development Economics* 149: 102602. <https://doi.org/10.1016/j.jdeveco.2020.102602>.
- Gobat, J. and K. Kostial. 2016. "Syria's Conflict Economy." IMF Working Paper 16/123, International Monetary Fund, Washington, DC.
- Gopinath, G., O. Itskhoki, and R. Rigobon. 2010. "Currency Choice and Exchange Rate Pass-Through." *American Economic Review* 100 (1): 304–36.
- Granger, C. W. 1969. Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica* 37 (3): 424–438.
- Guha-Sapir, D., and O. D'Aoust. 2011. "Demographic and Health Consequences of Civil Conflict." *World Development Report 2011*, Background Paper. World Bank, 2011.
- Ha, J., M. Stocker, and H. Yilmazkuday. 2019. "Inflation and Exchange Rate Pass-Through." Policy Research Paper 8780, World Bank, Washington, DC.
- Hamilton, K. and Nguyen, T. 2017. "Estimating Syrian Human Capital Loss Over the Civil War Years." Mimeo, World Bank, Washington, DC.
- Henderson, V., A. Storeygard, and D. N. Weil. 2011. "A Bright Idea for Measuring Economic Growth." *American Economic Review* 101 (3): 194–99.
- Henderson, J. V., A. Storeygard, and D. N. Weil. 2012. "Measuring Economic Growth From Outer Space." *American Economic Review* 102 (2): 994–1028.
- Hodler, R., and P. A. Raschky. 2014. "Regional Favoritism." *The Quarterly Journal of Economics* 129 (2): 995–1033.
- Hurn, S., V. Martin, P. C. Phillips, and J. Yu, J. 2021. *Financial Econometric Modeling*. Oxford, U.K.: Oxford University Press.
- Ihrig, J. E., M. Marazzi, and A. D. Rothenberg. 2006. "Exchange-Rate Pass-Through in the G-7 Countries." FRB International Finance Discussion Paper 851, Federal Reserve Board, Washington, DC.
- ILO (International Labour Organization). 2020a. *Facing Multiple Crises: Rapid Assessment of the Impact of COVID-19 on Vulnerable Workers and Small-scale Enterprises in Lebanon*. Geneva: International Labour Organization.
- ILO (International Labour Organization). 2020b. *Impact of COVID-19 on Workers in Jordan: A Rapid Assessment*. Geneva: International Labour Organization.
- Jašová, M., R. Moessner, and E. Takáts. 2019. "Exchange Rate Pass-Through: What Has Changed Since the Crisis?" *International Journal of Central Banking* 15 (3): 27–58.
- Jiang, J., and D. Kim. 2013. "Exchange Rate Pass-Through to Inflation in China." *Economic Modelling* 33: 900–912.
- Jiménez-Rodríguez, R., and A. Morales-Zumaquero. 2016. "A New Look at Exchange Rate Pass-Through in the G-7 Countries." *Journal of Policy Modeling* 38 (5): 985–1000.
- Johansen, S. 1988. "Statistical Analysis of Cointegration Vectors." *Journal of Economic Dynamics and Control* 12 (2–3): 231–254.
- Kilian, L., and H. Lütkepohl. 2017. *Structural Vector Autoregressive Analysis*. Cambridge, UK: Cambridge University Press.
- Koop, G., M. H. Pesaran, and S. M. Potter. 1996. "Impulse Response Analysis in Nonlinear Multivariate Models." *Journal of Econometrics* 74 (1): 119–147.
- Korhonen, I., and P. Wachtel. 2006. "A Note on Exchange Rate Pass-Through in CIS

- Countries." *Research in International Business and Finance* 20 (2): 215–226.
- Kreibaum, M., and S. Klasen. 2015. "Missing Men: Differential Effects of War and Socialism on Female Labour Force Participation in Vietnam." Discussion Paper 181, Courant Research Centre, Goettingen, Germany.
- Leigh, D., and M. Rossi. 2002. "Exchange Rate Pass-Through in Turkey." IMF Working Paper WP/02/04, International Monetary Fund, Washington DC.
- Lütkepohl, H., 2005. *New Introduction to Multiple Time Series Analysis*. Berlin: Springer Science & Business Media.
- Lütkepohl, H., and M. Krätzig. 2004. *Applied Time Series Econometrics*. Cambridge, UK: Cambridge University Press.
- McArthur, J. W., and G. C. McCord. 2017. "Fertilizing Growth: Agricultural Inputs and Their Effects in Economic Development." *Journal of Development Economics* 127: 133–152.
- McCarthy, J. 2007. "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies." *Eastern Economic Journal* 33 (4): 511–537.
- McGovern, M. E., A. Krishna, V. M. Aguayo, and S. V. Subramanian. 2017. "A Review of the Evidence Linking Child Sunting to Economic Outcomes." *International Journal of Epidemiology* 46 (4): 1171–1191.
- Menon, N., and Y. Van der Meulen Rodgers. 2015. "War and Women's Work: Evidence From the Conflict in Nepal." *Journal of Conflict Resolution* 59 (1): 51–73.
- Mercy Corps 2021. "Using Night Lights to Measure Economic Output in Syria." May 27, 2021. https://www.humanitarianaccesssteam.org/sites/default/files/reports-docs/Quantitative%20report_Using%20nighlights%20to%20measure%20economic%20output_May%202021_0.pdf.
- North Press Agency. 2021. "Syria To Import One Million Tons Of Wheat From Russia," December 6, 2021. <https://npasyria.com/en/68780/>
- North Press Agency. 2022. "Syria's Wheat Production Is Lowest In 50 Years," December 26, 2021. <https://npasyria.com/en/69764/>.
- OCHA (United Nations Office for the Coordination of Humanitarian Affairs). 2021. "Humanitarian Needs Overview: Syrian Arab Republic." United Nations, New York.
- Omar, N. S., and A. Ismal. 2019. "Night Lights and Economic Performance in Egypt." *Advances in Economics and Business* 7 (2): 69–81.
- Ortega, E., and C. Osbat. 2020. "Exchange Rate Pass-Through in the Euro Area and EU Countries." ECB Occasional Paper, European Central Bank, Frankfurt.
- Our World in Data (database). "Coronavirus Pandemic (COVID-19)." Accessed on January 3, 2022. <https://ourworldindata.org/coronavirus>.
- Patton, A. 2013. "Copula Methods for Forecasting Multivariate Time Series." In *Handbook of Economic Forecasting 2 (B)*, edited by G. Elliott and A. Timmermann, 899–960. North-Holland Publishing.
- Pesaran, H. H., and Y. Shin. 1998. "Generalized Impulse Response Analysis in Linear Multivariate Models." *Economics Letters* 58 (1): 17–29
- Phillips, P. C., and S. Ouliaris. 1990. "Asymptotic Properties of Residual Based Tests for Cointegration." *Econometrica: Journal of the Econometric Society* 58 (1): 165–193.
- Prakash, A., A. K. Shukla, C. Bhowmick, and R. Beyer. 2019. "Night-time Luminosity: Does It Brighten Understanding of Economic Activity in India?" *Reserve Bank of India Occasional Papers* 40 (1) 1–24.
- Roberts, M. 2021. "Tracking Economic Activity in Response to the COVID-19 Crisis Using Nighttime Lights – The Case of Morocco." *Development Engineering* 6: 100067. <https://doi.org/10.1016/j.deveng.2021.100067>.
- Rose, C. and A. Söderholm. 2022. Intelligence Briefing. "The Captagon Threat: A Profile of Illicit Trade, Consumption, and Regional Realities." New Lines Institute for Strategy and Policy, April 5, 2022. https://newlinesinstitute.org/wp-content/uploads/20220404-Captagon_Report-NLISAP-final-1.pdf.
- Ruta, M. 2022. *The Impact of the War in Ukraine on Global Trade and Investment*. Washington, DC: World Bank.

- Sharara, S. L., and S. S. Kanj. 2014. "War and Infectious Diseases: Challenges of the Syrian Civil War." *PLoS Pathogens* 10 (11) e1004438. <https://doi.org/10.1371/journal.ppat.1004438>.
- Silungwe, A., A. Baer, and V. Guerreiro. 2022. "Global Stocktaking of National Accounts Statistics: Availability for Policy and Surveillance." IMF Working Paper 2022/029, International Monetary Fund, Washington, DC.
- Storeygard, A. 2016. "Farther on Down the Road: Transport Costs, Trade and Urban Growth in Sub-Saharan Africa." *The Review of Economic Studies* 83 (3): 1263–1295.
- Sutton, P. C., and R. Costanza. 2002. "Global Estimates of Market and Non-market Values Derived From Nighttime Satellite Imagery, Land Cover, and Ecosystem Service Valuation." *Ecological Economics* 41 (3): 509–527.
- Syrian Center for Policy Research. 2017. "Social Degradation in Syria. The Conflict Impact on Social Capital." Damascus.
- The Syria Report. 2022a. "Brussels Conference Pledges Unexpectedly Rise to EUR 4.1 Billion." May 11, 2022. <https://syria-report.com/news/brussels-conference-pledges-unexpectedly-rise-to-eur-4-1-billion/>.
- The Syria Report. 2022b. "Government Removes Millions from Subsidy Programme, Triggering Rare Protests." February 8, 2022. <https://syria-report.com/news/government-removes-millions-from-subsidy-programme-triggering-rare-protests/>.
- The Syria Report. 2022c. "Government to Reduce Health and Education Subsidies, Media Says." March 15, 2022. <https://syria-report.com/news/government-to-reduce-health-and-education-subsidies-media-says/>.
- The Syria Report. 2022d. "Syrian Pound Exchange Rates – Central Bank of Syria and Black Market." March 31, 2022. <https://syria-report.com/library/rate-of-the-u-s-dollar-in-the-syrian-forex-market-2011-21-2/>.
- UNCTAD (United Nations Conference on Trade and Development). 2018. *Review of Maritime Transport 2018*. Geneva: UNCTAD.
- Urdal, H., and C. P. Che. 2013. "War and Gender Inequalities in Health: The Impact of Armed Conflict on Fertility and Maternal Mortality." *International Interactions* 39 (4): 489–510.
- World Bank. 2017. *The Toll of War: The Economic and Social Consequences of the Conflict in Syria*. Washington DC: World Bank.
- World Bank. 2019. *The Mobility of Displaced Syrians: An Economic and Social Analysis*. Washington DC: World Bank.
- World Bank. 2020. *The Fallout of War: The Regional Consequences of the Conflict in Syria*. Washington DC: World Bank.
- World Bank. Forthcoming. *Syria Joint Damage Assessment of Selected Cities*. Washington DC: World Bank.



THE WORLD BANK

1818 H Street, NW
Washington, DC 20433