

DETERMINANTS OF FORCED MIGRATION: THE VARYING EFFECTS OF
VIOLENCE AND ECONOMIC CONDITIONS ON SYRIAN REFUGEE FLIGHT

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A capstone project submitted to Johns Hopkins University in conformity with the
requirements for the degree of Master of Science in Government Analytics

Baltimore, Maryland
December, 2016

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Abstract

The majority of existing research on the impact of civil war on forced migration flows uses observations at the annual-global level, limiting the applicability of results to explaining aggregate trends. This article studies refugee flows from Syria to Jordan from 2012-2015 at the weekly level to test how violence and economic conditions affect the fluctuation of migration processes. The results of regression analysis offer support for the argument that all violence does not affect migration decisions uniformly; rather some types of violence produce higher migration flows, while others, such as chemical warfare, render conditions too unsafe to flee. Furthermore, while economic conditions in the origin country affect migration flows, conditions in the destination country do not, suggesting that economic opportunities outside the country are less consequential as a determinant of forced migration during civil war. The research demonstrates the importance of using data at low levels of temporal aggregation to uncover causal mechanisms underlying refugee flight.

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1. Introduction

1.1 Determinants of Forced Migration

The Syrian Civil War has caused one of the most devastating humanitarian crises in modern times. Estimates of the death toll since March 2011 range between 300,000 to 470,000 people.¹ The United Nations High Commissioner for Refugees (UNHCR) reports that about 6.6 million are internally displaced within Syria while 4.8 million are registered refugees in Jordan, Lebanon, Turkey, Egypt, and Iraq.² The conflict shows few signs of abating and many more Syrians are at risk of being displaced or killed by government forces and non-state armed groups.

The civil war has contributed to a global refugee crisis that has surpassed the number displaced after World War II.³ One out of every 113 people in the world are displaced and over half of all the refugees come from Syria, Afghanistan, and Somalia, with the Syrian conflict producing the highest number of forcibly displaced people.⁴ Refugee camps tend to be severely underfunded, comprising the health and safety of refugees. The UNHCR reports a funding shortage of \$1.1 billion for 2016, 56% of its total requirements.⁵

Given the situation, it is imperative to develop strategies for refugee camp management that adapt to changes in refugee flow. Despite the urgency of the issue, there is still debate among scholars over the factors that influence fluctuations in forced

¹ Anne Barnard, "Death Toll From War in Syria Now 470,000, Group Finds," The New York Times, last modified February 11, 2016, <http://www.nytimes.com/2016/02/12/world/middleeast/death-toll-from-war-in-syria-now-470000-group-finds.html>

² Syrian Refugees, "The Syrian Refugee Crisis and its Repercussions for the EU," last modified September 2016, <http://syrianrefugees.eu/>

³ Euan McKirdy, "UNHCR report: More displaced now than after WWII," last modified June 20, 2016, <http://www.cnn.com/2016/06/20/world/unhcr-displaced-peoples-report/>

⁴ Ibid.

⁵ UNHCR, "Syria Regional Refugee Response," last modified November 7, 2016, <http://data.unhcr.org/syrianrefugees/regional.php>

migration, especially on a weekly level. This research studies refugee flows from Syria to Jordan from January 2012 – February 2015 at the weekly level to test how economic conditions in the host and destination countries, violence, and cultural factors affect forced migration. The results of the negative binomial regression offer support for the argument that all violence does not affect migration decisions uniformly; rather some types of violence, such as deaths caused from shootings, produce higher migration flows, while others, such as deaths caused from the use of chemical or toxic gases, render conditions too unsafe to flee and decrease migration flows. Furthermore, we find that worsening economic conditions in Syria lead to an increase in migration flows but conditions in the destination country are not an important factor. Economic opportunities outside the country seem to be less consequential as a determinant of forced migration during civil war. Finally, the results presented in this article show that, in accordance with more recent literature on the subject, cultural networks do not play a significant role in influencing migration flows. Understanding what factors affect fluctuations in migration flows may allow refugee camps and host countries to more efficiently plan for the food, housing, and medical supplies necessary to help refugees after their journey out of Syria. In the following sections, we give a brief background of the Syrian conflict, discuss previous research and the theoretical framework, explain the data and methods employed, and present our results.

1.2 Background of the Syrian Civil War

The Syrian Civil War was sparked by pro-democracy protests in March 2011.⁶ Syrians demanded an end to the Assad regime, which has ruled since 1971. In response,

⁶ Encyclopaedia Britannica, “Syrian Civil War,” last modified December 8, 2015, <https://www.britannica.com/event/Syrian-Civil-War/Uprising-in-Syria-2011-12>

President Bashar al-Assad enacted a violent crackdown against the protestors. In Dar'a, security forces fired upon citizens protesting the arrest of fifteen children for spray-painting anti-government graffiti on buildings.⁷ Protests intensified and spread, and the government escalated the violence against Syrians. By 2012, it became clear that the civil war was on the verge of transforming into a regional proxy war. Turkey, Saudi Arabia, and Qatar were funding and arming rebels while Iran, Hezbollah, and Russia support the government.⁸ The conflict has been marked by the use of chemical warfare on civilians. On August 21, 2013, rockets carrying sarin gas were fired in the suburbs of Damascus, killing hundreds of men, women, and children.⁹ While the U.S., British, and French governments considered strikes against the Assad regime, instead Russia, Syria, and the U.S. agreed in September 2013 to place Syria's chemical weapons under international control.¹⁰ The use of chemical weapons continued; in March 2015, Human Rights Watch reported that evidence indicated that the government dropped barrel bombs containing chlorine gas from helicopters in rebel-held areas.¹¹ Following these attacks, the U.S. agreed to provide support to the rebels. However, the situation had been made even more complex by the rise of Islamism within rebel groups. The U.S., Bahrain, Jordan, Qatar, Saudi Arabia, and the United Arab Emirates launched strikes against ISIS in September 2014.¹² Russia began its own military offensive a year later.¹³

⁷ Ibid.

⁸ Independent, "Syrian civil war timeline: Tracking five years of conflict," last modified March 13, 2016, <http://www.independent.co.uk/news/world/middle-east/syrian-civil-war-timeline-tracking-five-years-of-conflict-a6929411.html>

⁹ Ibid.

¹⁰ Ibid.

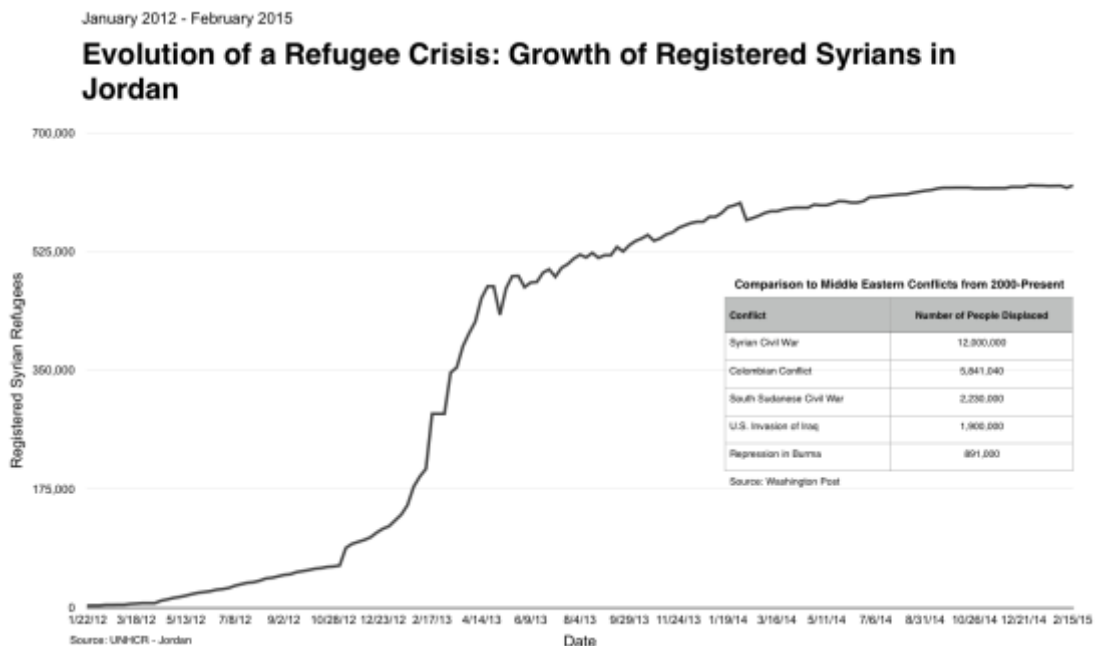
¹¹ Human Rights Watch, "Syria: Chemicals Used in Idlib Attacks," last modified April 13, 2015, <https://www.hrw.org/news/2015/04/13/syria-chemicals-used-idlib-attacks>

¹² Independent, "Syrian civil war timeline: Tracking five years of conflict."

¹³ Ibid.

Widespread shelling, shootings, and increasing reports of kidnapping and torture by both the government and rebel groups created a refugee crisis as civilians fled the threat of starvation, abuse, and death. In August 2014, NGOs issued a call to the international community to increase support for Syrian refugees as they began to overwhelm the main host countries.¹⁴ Figure 1 shows the growth of refugees from Syria to Jordan from January 2012 – February 2015, the period of time under study.

Figure 1. Evolution of a Refugee Crisis



2. Literature Review and Theoretical Framework

Why does an individual flee their home? Discussions of forced migration and refugee issues often assume that people flee their country because they have no choice. Forced migration is defined as “the movement of people under circumstances of

¹⁴ Deutsche Welle, “NGOs urge countries to take in Syrian refugees,” accessed October 1, 2016. <http://www.dw.com/en/ngos-urge-countries-to-take-in-syrian-refugees/a-18115151>

coercion, typically involving threats to life and livelihood.”¹⁵ The definition implicitly confirms that notion. However, the literature on forced migration is motivated by the argument that the decision to leave, even in the face of extreme conditions and violent conflict, is a choice. In Syria, 4.8 million people have left their homes to seek shelter in other countries; millions others have stayed. Studying the causes of forced migration entails an effort to understand why some have left and others have stayed. This research seeks to quantify the relative effects of violence, economic conditions, and cultural networks on decisions to migrate, using data aggregated at a lower level than previous research.

Scholars disagree on what affects one’s decision to migrate, but nearly all are in agreement on the conceptualization of migration as a decision. For this reason, rational choice theory, which argues that humans are rational, value their life, liberty, and physical person, and will make decisions that they perceive to be in their best self-interest, can be found at the core of forced migration studies.^{16 17 18 19} Therefore, a primary focus of forced migration scholarship is to specify the factors that will affect an individual’s perception about the value of migration against the value of staying in their home. I will discuss the dominant schools of thought in the literature that seek to explain the migration decision, which include economic conditions, the role of violence, and cultural networks.

¹⁵ Jenny Birchall, “Gender, age and migration: An extended briefing,” *Institute of Development Studies* (2016).

¹⁶ Christian Davenport, Will Moore, and Steven Poe, “Sometimes you just have to leave: Domestic threats and forced migration, 1964-1989,” *International Interactions* 29, no. 1 (2003): 27-55.

¹⁷ Will Moore and Stephen Shellman, “Refugee or internally displaced person? To where should one flee?” *Comparative Political Studies* 39, (2006).

¹⁸ Will Moore and Stephen Shellman, “Fear of Persecution,” *Journal of Conflict Resolution* 48, no 5 (2004): 723-745

¹⁹ Eric Neumayer, “Bogus refugees? The Determinants of Asylum Migration to Western Europe,” *International Studies Quarterly* 49, no. 4 (2005)

2.1 Effect of Economic Conditions on Forced Migration

The literature suggests the importance of the presence or absence of economic opportunities in affecting forced migration. Economic opportunities can operate as a push factor, leading to more forced migration but also as a pull factor, leading individuals to make their migration decision based on where they are most likely to have more economic opportunities.^{20 21} Large- n analyses have shown that the level of economic development and poverty in the origin and destination is connected with forced migration.^{22 23} Empirical studies show mixed results. Some have failed to find that GNP and GDP per capita predict forced migration.^{24 25} However, other scholars found that countries with higher levels of economic development, even when experiencing conflict, produce fewer refugees, a finding that Moore and Shellman's work supported.^{26 27} A closer analysis of how economic variables contribute to the migration decision is therefore necessary.

2.2 Effect of Violence on Forced Migration

While there is strong support in the literature on the relationship between civil violence and forced migration, debate surrounds the causal mechanisms underlying this

²⁰ Prakash Adhikari, "The Plight of the Forgotten Ones: Civil War and Forced Migration," *International Studies Quarterly* 56, no. 3 (2012): 590-606.

²¹ Will Moore and Stephen Shellman, "Whither Will They Go? A Global Study of Refugee Destinations, 1965-1995," *International Studies Quarterly* 51, no. 4 (2007): 811-834.

²² Christian Davenport, Will Moore, and Steven Poe, "Sometimes you just have to leave: Domestic threats and forced migration, 1964-1989."

²³ Will Moore and Stephen Shellman, "Whither Will They Go? A Global Study of Refugee Destinations, 1965-1995."

²⁴ Christian Davenport, Will Moore, and Steven Poe, "Sometimes you just have to leave: Domestic threats and forced migration, 1964-1989."

²⁵ Erik Melander and Magnus Öberg, "Time to Go? Duration Dependence in Forced Migration." *International Interactions* 32, no. 2 (2007). doi:10.1080/0305062060057483

²⁶ Susanne Schmeidl, "Exploring the Causes of Forced Migration: A Pooled Time Series Analysis, 1971-1990," *Social Science Quarterly* 78, no. 2 (1997): 284-308.

²⁷ Will Moore and Stephen Shellman, "Fear of Persecution."

process.^{28 29 30 31} One approach focuses on how the type of armed conflict affects refugee flows. Some scholars have found that international wars can cause increases in the number of refugees; others have shown that the effect is rather small.^{32 33 34} The presence of foreign troops in a country was found to be significant in a cross national study covering more than forty years.³⁵ There is also conflicting support for the hypothesis that ethnic conflict produces more forced migration than non-ethnic conflicts.^{36 37} Another approach focuses on how the perpetrators of violence influence forced migration. Government violence, compared to violence from rebel groups, was found to heavily influence displacement.³⁸ Genocide, politicide, and state repression were also found to be predictors of increases in forced migration. Other scholars have studied how human rights violations, the level of political freedoms, and political terror cause forced migration.³⁹ States with frequent human rights violations, a lack of freedom, and high level of political terror tend to produce more forced migrants. However, since most studies have relied on national measures of violence, they have been unable to apply the findings to an individual's decisions to migrate.⁴⁰ More recent scholarship has turned to

²⁸ Lance Clark, "Early warning of refugee flow," *Refugee Policy Group*, (1989).

²⁹ Susanne Schmeidl, "From Root Cause Assessment to Preventive Diplomacy: Possibilities and Limitations of an Early Warning of Forced Migration," Unpublished dissertation, The Ohio State University (1995).

³⁰ Apodaca, Clair, "Human Rights Abuses: Precursor to Refuge Flight?" *Journal of Refugee Studies* 1, no. 1 (1998): 80–93.

³¹ Christian Davenport, Will Moore, and Steven Poe, "Sometimes you just have to leave: Domestic threats and forced migration, 1964-1989."

³² Aristide Zolberg,., Astri Suhrke, and Sergio Aguayo. *Escape from Violence: Conflict and the Refugee Crisis in the Developing World*. (New York, NY: Oxford University Press, 1998).

³³ Susanne Schmeidl, "Exploring the Causes of Forced Migration: A Pooled Time Series Analysis, 1971-1990."

³⁴ Christian Davenport, Will Moore, and Steven Poe, "Sometimes you just have to leave: Domestic threats and forced migration, 1964-1989."

³⁵ Will Moore and Stephen Shellman, "Fear of Persecution."

³⁶ Chaim Kaufman. "When All Else Fails: Ethnic Population Transfer and Partitions in the Twentieth Century," *International Security* 23, no. 2 (1998): 120-156.

³⁷ Erik Melander and Magnus Öberg, "The Threat of Violence and Forced Migration: Geographical Scope Trumps Intensity of Fighting," *Civil Wars* 9, no. 2 (2007):156–173.

³⁸ Will Moore and Stephen Shellman, "Fear of Persecution."

³⁹ Ibid.

⁴⁰ Prakash Adhikari, "The Plight of the Forgotten Ones: Civil War and Forced Migration."

studying the effect of threats to physical integrity of life on individual level behavior.⁴¹

Violence and the presence of paramilitary and guerrilla groups were found to be strongly connected with migration out of the country in Colombia, but in Mexico and Costa Rica, increases in fatalities were actually associated with a lower likelihood of migration to the United States.⁴² An event history of analysis of civil conflict in Chitwan, Nepal revealed that the effect of violence on migration varied for different destinations and according to the distance of the move.⁴³

While the literature agrees that violence is a primary factor affecting migration, it is still unclear as to how the intensity of violence and type of violence influences flows out of the country. Research has found support for the idea that migration caused by armed conflict is characterized by threshold effects. Some studies have shown that at a high level of violence, movement becomes more dangerous but at a low level of violence, the impetus to migrate is lessened and risk of personal harm can be minimized by staying in one's house.⁴⁴ Conversely, research on migration from Chitwan, Nepal during civil conflict showed that only when experiencing high levels of violence will individuals decide to migrate because even the risks of movement outweigh the potential risks associated with staying at home.⁴⁵ Other studies have shown that it is not the intensity of the conflict that drives migration but rather the geographic scope and the extent to which urban centers are affected by the violence.⁴⁶ There is also debate on how the type of

⁴¹ Pratikshya Bohra-Mishra and Douglas Massey, "Individual decisions to migrate during civil conflict." *Demography* 48, no. 2 (2011): 401-424.

⁴² Ana María Ibáñez and Carlos Eduardo Vélez, "Civil Conflict and Forced Migration: The Micro Determinants and Welfare Losses of Displacement in Columbia." *World Development* 36, no. 4 (2008): 659-676.

⁴³ Prakash Adhikari, "The Plight of the Forgotten Ones: Civil War and Forced Migration."

⁴⁴ Pratikshya Bohra-Mishra and Douglas Massey, "Individual decisions to migrate during civil conflict."

⁴⁵ Prakash Adhikari, "The Plight of the Forgotten Ones: Civil War and Forced Migration."

⁴⁶ Erik Melander and Magnus Öberg, "The Threat of Violence and Forced Migration: Geographical Scope Trumps Intensity of Fighting."

violence affects out migration. Military sweeps instead of the number of deaths were found to have a stronger influence on the movement of undocumented migrants from El Salvador to the United States.⁴⁷ Therefore, while studies have shown that migration is affected by the type of conflict and perpetrator of violence, research has not focused on how specific kinds of violence prompt migration flows. These types of studies necessitate the use of smaller temporal units, as opposed to the traditional large n- pooled cross-sectional time series studies that analyze country-years which are commonly found in the literature.⁴⁸ Using national level variables to predict an individual's decision to migrate assumes that people individuals are uniformly affected by aggregate levels of the variables when, in fact, these variables vary greatly in time and space. This study aims to build on the current body of literature by considering the type of violence in Syria on a weekly level.

2.3 Effect of Cultural Networks on Forced Migration

Finally, this research tests how cultural networks affect migration out of Syria to a bordering country. Cultural networks are generally measured by a lagged value of the stock of refugees in the destination country. Scholars argue that having an established cultural network outside of the country provides information about the journey and the destination, therefore reducing uncertainty associated with the process.⁴⁹ The presence of strong cultural networks would then be expected to have a strong, positive relationship with forced migration flows. However, other studies have found that the accumulated stock of refugees decreases the probability of further forced migration. Instead, they find

⁴⁷ Pratikshya Bohra-Mishra and Douglas Massey, "Individual decisions to migrate during civil conflict."

⁴⁸ Stephen Shellman and Brandon Stewart, "Predicting Risk Factors Associated with Forced Migration: An Early Warning Model of Haitian Flight," *Civil War* 9, no. 2 (2007), doi: 10.1080/13698240701207344

⁴⁹ Stephen Shellman and Brandon Stewart, "Predicting Risk Factors Associated with Forced Migration: An Early Warning Model of Haitian Flight."

evidence of duration dependence in migration.⁵⁰ Contrary to assuming that the costs and benefits of migration are the same for all individuals, they argue that some people are more likely to relocate than others. They find evidence of a selection effect where after some time, those that have not yet migrated, are less likely to as even as the conflict continues. This study tests how the strength of cultural networks affects the flow of migration from Syria to Jordan.

3. Data and Methods

3.1 Case Selection

This research focuses on refugee flows from Syria to Jordan for several reasons. Jordan borders Syria and is the third largest host of refugees, following Turkey and Lebanon. The dependent variable, refugee flows, varies significantly over time ranging from hundreds to tens of thousands refugees per week. We can then study the effect of our independent variables on the fluctuation of those flows over time. Also, in order to study the influence of economic conditions in the origin and destination countries, with other independent variables held constant, it was necessary to limit the scope to a single dyad: Syria to Jordan. This allows us to model the push-pull factors exerted by the origin and destination countries. By merging data of other host countries, we would be unable to determine the destination of each refugee and thus would be unable to ascertain how the economic conditions in the destination country affected an individual's decision to subsequently flee to that country. In addition, a case study approach to forced migration issues enables a closer examination of the important variables affecting that particular dyad, in contrast to more general findings offered by global studies. Furthermore, the

⁵⁰ Erik Melander and Magnus Öberg, "Time to Go? Duration Dependence in Forced Migration."

refugee crisis in Syria is an important humanitarian and political issue. Studying the nature of the crisis may lead to the development of policies that more attuned to the nuances of the conflict. Refugee camps in Jordan may better prepare for sudden influxes of Syrian refugees if they understand the factors affecting them.

3.2 Unit of Observation

Refugee flows from Syria to Jordan are analyzed on a weekly level. This has a number of advantages over the traditional large- n, cross-sectional time-series studies on annual forced migration. Literature on the effects of temporal aggregation has shown that over-aggregation can distort time series properties of the data and mask interaction effects. It can also affect standard errors and coefficient estimates.⁵¹ Also, global studies tend to introduce general measures that do not consider the, sometimes subtle, differences between countries that can have a significant effect on the results. Smaller temporal units may be better suited to studying causal mechanisms at work. Finally, it is necessary to use smaller temporal units when studying a single case in order to increase the number of observations.⁵² Therefore, this research aggregates violence data at the weekly level.

3.3 Data and Measurement

As this research seeks to analyze the relationship between refugee flows from Syria to Jordan and economic, violence, and cultural network variables over time, we use time- series datasets covering the period of January 22, 2012 - February 15, 2015.

⁵¹ Stephen Shellman and Brandon Stewart, "Predicting Risk Factors Associated with Forced Migration: An Early Warning Model of Haitian Flight."

⁵² Ibid.

The model is,

$$\begin{aligned}
& \text{Syrian Migration to Jordan}_t \\
& = \text{SyriaCPI}_t + \text{JordanCPI}_t + \text{Deaths from chemical and Toxic gases}_{t-1} \\
& + \text{Deaths from Explosions}_{t-1} + \text{Deaths from Field Executions}_{t-1} \\
& + \text{Deaths from Shellings}_{t-1} + \text{Deaths from Shootings}_{t-1} \\
& + \text{Deaths from Victims Not Allowed to Seek Medical Help}_{t-1} \\
& + \text{Deaths from Warplane Shelling}_{t-1} \\
& + \text{Deaths from Detention or Kidnapping}_{t-1} + \text{Syrian Migrant Stock}_{t-1}
\end{aligned}$$

3.4 Dependent Variable

Data on forced migration flows from Syria to Jordan was drawn from the Consortium for Applied Research on International Migration- South Project (CARIM-South).⁵³ The project is dedicated to researching migration issues and monitoring migration stocks and flows in South and East Mediterranean countries. They compile data from the Syria Regional Refugee Response Inter-agency Information Sharing Portal of the UNHCR, the United Nations Refugee Agency. Data on registered refugees is updated almost daily. The dependent variable is then the net count of refugees from Syria that are registered in Jordan in a given week. This was obtained by taking the most recent registration figure from the week, subtracting the sum for the previous week, and then truncating the negative values at zero. This practice is common in forced migration studies.⁵⁴ However, the measure has limitations. Because the figure represents the total number registered, it includes births and deaths that occur in the camps. The measure is also updated when people leave the country and register in other host countries such as Egypt, resulting in a potential underestimation of the refugee flow that week. Given the nature of the conflict and because Syrians in Jordan tend to either stay in the camps that

⁵³ CARIM-South, "Evolution of the number of registered refugees from Syria in Jordan." (2015) Accessed September 21, 2016, <http://carim-south.eu/database/demo-eco-module/evolution-of-the-number-of-registered-refugees-from-syria-in-jordan-19012012-to-23082015/>.

⁵⁴ Erik Melander and Magnus Öberg, "The Threat of Violence and Forced Migration: Geographical Scope Trumps Intensity of Fighting."

have evolved into more permanent settlements or resettle in urban areas of the country, it is likely the effect is relatively low.

3.5 Syria and Jordan Economic Indicators

To measure economic conditions in Syria and Jordan, we use the monthly Consumer Price Index (CPI) found at Trading Economics.⁵⁵ The CPI measures changes in the prices paid by consumers for a basket of goods and services, including food and clothing. Because this data is monthly, rather than weekly, we used the monthly indicator for each month's corresponding weeks. The measures represent the economic pull of Jordan, the destination country, as well as the push factors exerted on Syrians. We expect the economic variable for the destination country to be negatively signed, indicating that inflation is low. However, we expect the economic variable for the origin country to be positively signed, indicating that inflation is high. When the price of goods and services are too expensive, living conditions may become untenable, incentivizing Syrians to leave the country.

3.6 Syrian Violence Indicators

In order to measure the level of violence in the country, as well as determine the type of violence that occurred, we draw from the Violations Documentation Center in Syria (VDC-SY) database on fatalities. The VDC-SY records the name, status (civilian or non-civilian), sex, province killed, place of birth, date of death, cause of death, and actors. In this study, only the date of death and cause of death are used. Causes of death include chemical and toxic gases, explosion, field execution, shelling, shooting, victim not allowed to seek medical help, warplane shelling, and detention or kidnapping.

⁵⁵ Trading Economics. "Jordan Consumer Price Index." 2016. Accessed October 1, 2016. <http://www.tradingeconomics.com/jordan/consumer-price-index-cpi>

Because of the obvious difficulty of gathering conflict data, it is particularly important to evaluate uncertainty in this variable. The VDC is one of the largest organizations in Syria that documents human rights violations by both the government and armed opposition groups. They employ a multiple-stage process of documentation to achieve the highest level of accuracy possible during the conflict. In the first stage, field activists and reporters assigned by the center in different places gather and document information.⁵⁶ The administrative team validates the data, ensuring it is recent and has not yet been documented. The second stage consists of gathering more information on the reported casualties and is completed within a day or two. Finally, during the third stage, information is sent back to the field activists to ensure it is accurate and complete missing data, if possible. This approach represents one of the most stringent adopted by human rights organizations that gather data in Syria.⁵⁷

Other data sources for fatalities that cover this time period exist, including databases by the Syrian Center for Statistics and Research (CSR-SY) and Syrian Network for Human Rights (SNHR). The Human Rights Data Group studied the differences between the datasets and found that the CSR-SY, SNHR, and VDC report comparable patterns of violence over time, increasing this study's confidence in the measure's internal validity.⁵⁸ However, data from the CSR-SY and SNHR only report monthly death tolls on their website. Therefore, we scraped the VDC website to obtain data on date and cause of deaths.

⁵⁶ VDC-SY. 2016. http://vdc-sy.net/Website/?page_id=849

⁵⁷ Ibid.

⁵⁸ Price, Megan, Anita Gohdes, and Patrick Ball. "Updated statistical analysis of documentation of killings in the Syrian Arab Republic." Human Rights Data Analysis Group, (2014).

The data is likely to have selection bias. Each killing does not have an equal chance of being reported. Its likelihood of being reported is affected by both the characteristics of the victim, the field practices of the organization, and the location of the death. Many of the groups that gather violence data in Syria report difficulty getting information in areas loyal to the government, including Tartus and Latakia.⁵⁹ These drawbacks tend to be inherent to conflict data; the selection bias exhibited differs according to the case under study.

We expect that different causes of deaths and intensity of killings will have varying effects on the flow of refugees. An increase in causes of deaths that render conditions too dangerous to travel and flee the country such as chemical and toxic gases, shelling, and explosions will be negatively signed. However, increases in other causes of deaths that make conditions at home unsafe and incentivize the perilous journey, such as shootings, detention and kidnapping, not being allowed to seek medical attention, and field executions will be positively signed.

3.7 Cultural Network Indicator

To measure the effect of cultural networks on refugee flow from Syria to Jordan, we use a lagged value of the stock of forced migrants stock variable. This is typical of forced migration studies.⁶⁰ We expect it to be positively signed to indicate that previous Syrian refugees provide information to citizens considering fleeing, as well as establish a potential community outside of the country.

Summary statistics for the independent variables are reported below in Table 1.

⁵⁹ Ibid.

⁶⁰ Stephen Shellman and Brandon Stewart, “Predicting Risk Factors Associated with Forced Migration: An Early Warning Model of Haitian Flight.”

Table 1. Descriptive Statistics

| Variable | Mean | Std. Dev. | Minimum | Maximum |
|--|------------|------------|---------|---------|
| Syria CPI | 311.75 | 91.8 | 172.37 | 491.56 |
| Jordan CPI | 113.7 | 3.65 | 105.8 | 118.2 |
| Total Syrian Refugees in Jordan | 379,611.22 | 248,938.29 | 2,886 | 622,865 |
| Chemical and Toxic Gases (deaths per week) | 6.51 | 72.74 | 0 | 923 |
| Explosion | 17.43 | 22.52 | 0 | 159 |
| Field Execution | 56.5 | 71.99 | 0 | 406 |
| Shelling | 174.85 | 124.81 | 10 | 593 |
| Shooting | 254.99 | 108.73 | 28 | 562 |
| Unallowed to seek medical help | 1.11 | 1.45 | 0 | 7 |
| Warplane Shelling | 100.27 | 86.12 | 0 | 432 |
| Detention/Kidnapping | 47.81 | 25.29 | 9 | 169 |

Sources: Trading Economics; VDC-SY; UNHCR

3.8 Methods

We use a negative binomial regression to estimate the effect of economic conditions, type of violence, and cultural networks on the flow of refugees from Syria to Jordan. Negative binomial models are appropriate when the dependent variable is a count and not normally distributed. While a Poisson model can also be used when the dependent variable is the number of times something has occurred, it assumes that each event is independent of one another. It also assumes that the conditional mean of the outcome is equal to the conditional variance. Because it is likely that individual's decision to migrate are connected by a common set of information, they are not independent and a Poisson model cannot be used.⁶¹ In addition, we report robust standard errors because of the potential problems with serial correlation when modeling time processes.⁶²

⁶¹ Ibid.

⁶² Ibid.

4. Results

We report our results for the negative binomial regression in Table 2. From the Wald chi-square statistic, we find that the model as a whole is statistically significant. The results show that the key variables in explaining fluctuations in the flow of refugees from Syria to Jordan are economic conditions in Syria, the number of deaths caused by chemical and toxic gases, and the number of deaths caused by shooting.

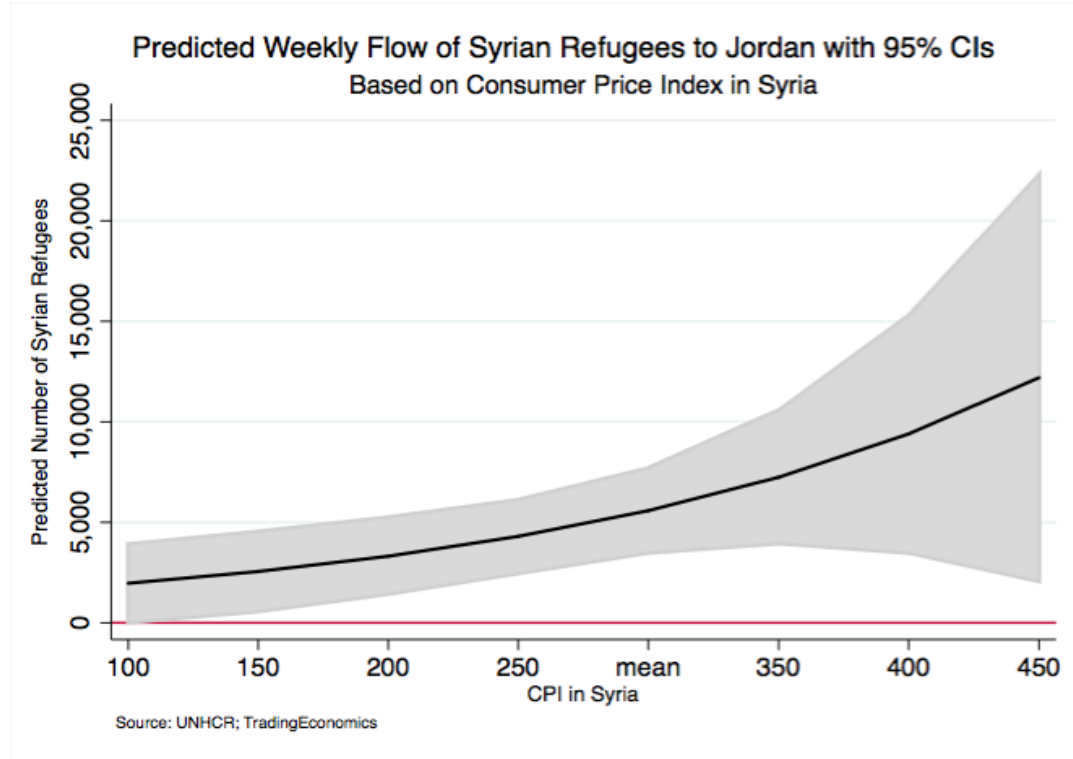
Table 2. Negative Binomial Estimates of Weekly Syrian Refugee Flow to Jordan

| <i>Category</i> | Count |
|---|-------------------------|
| Variable | Coefficient (Robust SE) |
| <i>Economy</i> | |
| Syria CPI | 0.005** (0.002) |
| Jordan CPI | 0.029 (0.129) |
| <i>Violence</i> | |
| Chemical and Toxic Gases | -0.014*** (0.002) |
| Explosion | 0.005 (0.005) |
| Field Execution | -0.002 (0.002) |
| Shelling | 0.00007 (0.002) |
| Shooting | 0.008*** (0.002) |
| Unallowed to seek medical help | -0.010 (0.089) |
| Warplane Shelling | -0.001 (0.002) |
| Detention/Kidnapping | 0.007 (0.005) |
| <i>Network</i> | |
| Lagged Refugee Stock | -0.000 (0.000) |
| Constant | 1.573 (13.88) |
| N | 160 |
| <i>Model Fit</i> | |
| Alpha (Poisson v. Negative Binomial) | 4.631 |
| Wald Chi-Square | 146.72*** |
| Significance Levels: *** .01 level; ** .05 level; * .10 level | |

4.1 Importance of Economic Conditions in Origin Country

The model shows that while economic conditions in the origin country can help to explain the flow of refugees, conditions in the destination country do not. In contrast to other studies on forced migrations, economic conditions in Jordan do not act as a pull factor, incentivizing Syrians to flee. This may show that when economic conditions in the origin country are extreme, consideration of job opportunities in the destination country fails to be important. Economic opportunities outside the country are less consequential as a determinant of forced migration during civil war. As expected, we find that the CPI in Syria had a positive, significant effect on the flow of refugees. When the CPI in Syria rises, indicating higher inflation and a higher cost of living, more people flee the country. An increase by one point in Syria's CPI, holding the other variables in the model constant, is expected to increase the rate of refugees fleeing to Jordan by a factor of 1.005. We also can examine the predicted counts of Syrian refugees to Jordan at varying levels of the CPI, when holding the other variables in the model at their means. The predicted weekly flow at different values of the CPI in Figure 2. When the Syria's CPI is at its mean of 300, we would expect 5,578 refugees to flee to Jordan. However, if it rises to 400, we would expect 9,395 refugees to flee that week.

Figure 2. Predicted Weekly Flow of Refugees based on CPI in Syria

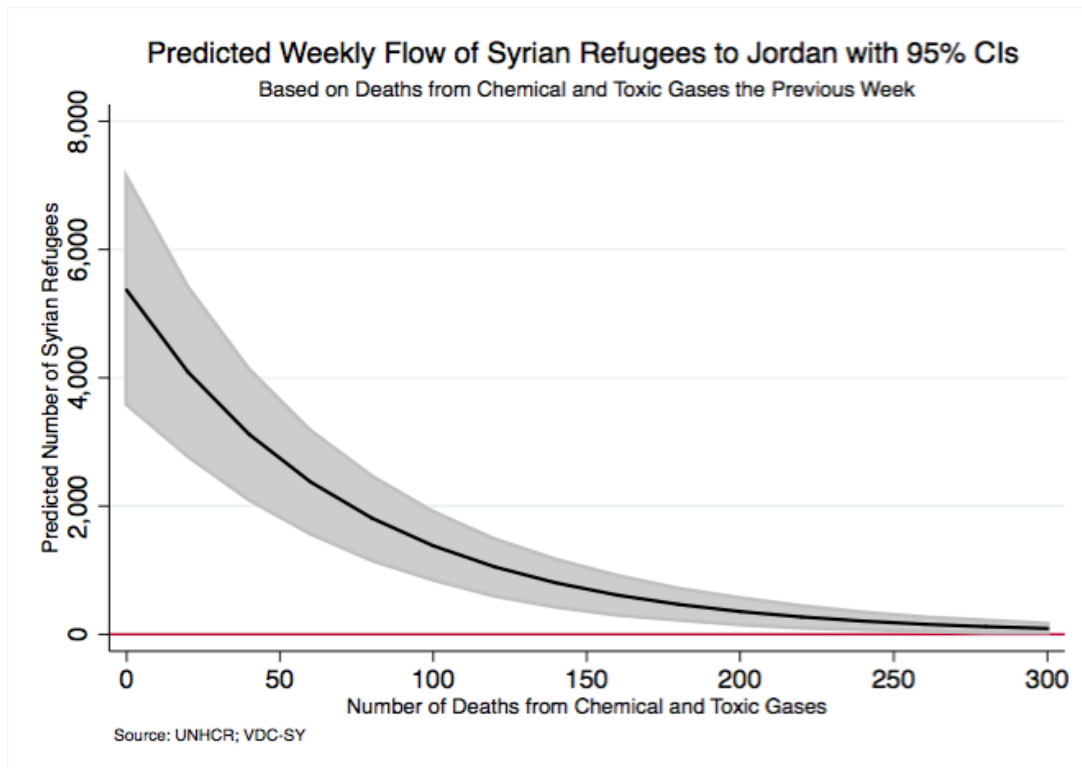


4.2 Effect of Type of Violence on Direction of Relationship to Refugee Flows

We can now examine how the type and intensity of violence affected fluctuations in the flow of refugees from Syria to Jordan. The model demonstrates that the number of deaths from chemical and toxic gases and the number of deaths from shooting influence the number of refugees per week. As anticipated, the number of people killed from chemical and toxic gases had a negative, significant effect on the flow of refugees. When more Syrians die as a result of chemical warfare, fewer flee the country the next week. This lends support to the argument that certain types of violence render conditions in the country too unstable and dangerous to flee. The effect may be especially pronounced when forces use chemical agents against a population because those affected need to get immediate medical attention while others may fear further attacks and stay in their

homes. We find that an increase of one death from chemical or toxic gases, holding economic conditions, other violence, and cultural factors constant, is expected to decrease the flow of refugees to Jordan by a factor of 0.99. We also find the predicted number of Syrians fleeing to Jordan per week depending on the number of deaths from chemical or toxic gases, while holding the other variables at their means. Figure 3 depicts this relationship. For example, when there are no deaths from chemical warfare, we would expect 5,365 Syrians to flee to Jordan that week. When the death toll increases to 200 Syrians, we'd expect that only around 350 Syrians would make the journey to Jordan.

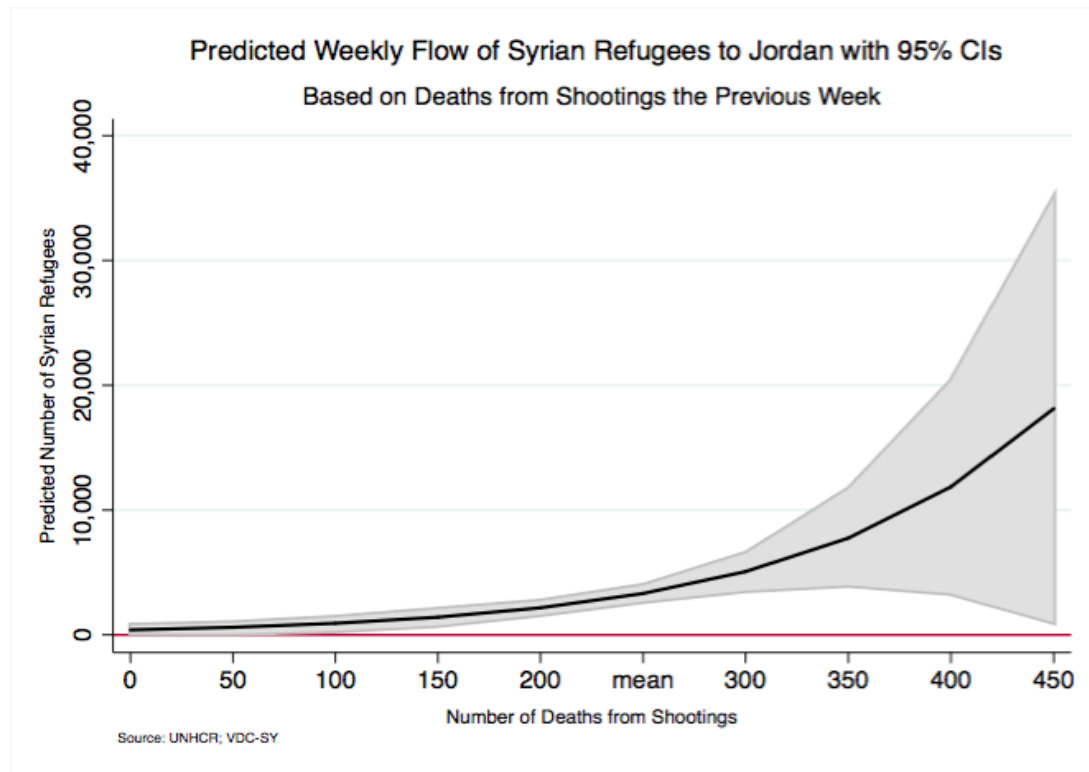
Figure 3. Predicted Weekly Flow of Refugees Based on Deaths from Chemical Warfare



The results of the model also show a positive, significant relationship between the number of deaths from shooting and the number of refugees that subsequently flee to

Jordan the next week. This offers further support for the argument that increases in violence that make conditions in the country extremely dangerous act as an incentive to flee. While the threat of being killed as a result of shooting still exists along that journey, the danger may be greater to remain at home. We find that an increase of one death from shooting can be expected to increase the flow of refugees from Syria to Jordan by a factor of 1.009. The predicted number of Syrian refugees to Jordan per week, depending on the number of deaths from shooting and holding other variables at their means, can be found in Figure 4. As the number of deaths from shootings increase, greater flow to Jordan can be expected. When about 350 Syrians die the previous week from shooting, the average during this conflict, we may expect about 7,755 to flee to Jordan. When the number of deaths approach 400, Jordan can expect more than 11,000 Syrians.

Figure 4. Predicted Weekly Flow of Refugees Based on Deaths from Shootings



The model shows that there is a fundamental difference in the relationship between certain types of violence and others. All violence does not impact fluctuations in migration processes in the same direction. While the use of chemical warfare decreases the number of Syrians fleeing to Jordan, deaths by shooting increases the number of migrants who decide to flee.

4.3 Lack of Effect of Cultural Networks on Forced Migration

We don't find support for the hypothesis in the literature that cultural networks reduce the uncertainty associated with migration and subsequently have a positive relationship with refugee flows. In this model, the lagged stock of Syrians in Jordan is not significant and negatively signed. This may support the argument for duration dependence in forced migration. As the conflict drags on, migrants that possess the characteristics that make them inclined to fleeing have already left. Those that remain may be less inclined or less able to leave. The potential self-selection in forced migration certainly warrants further study.

5. Conclusion

This research found that the economic conditions in the origin country, and the number of deaths from chemical warfare and shootings influence Syrian migration to Jordan. We find further support for the argument that economic conditions in the host country act as a push factor, but economic opportunities in the destination country are less consequential in migration decisions during a civil war. We also found that different types and varying levels of violence influence the migration processes in sometimes opposite directions, supporting previous research that found that it is important to differentiate between the type of violence to predict the flow of refugees. Some kinds of

violence, such as chemical warfare, create conditions where the risks of movement are greater than the potential risk of staying home. Others, such as shootings, act as a push factor and increase the number of Syrians fleeing. Finally, the results show that cultural networks were not significant in predicting how many Syrians migrate to Jordan in a week. Rather, it points to the potential impact of self-selection in migration trends.

However, this research has limitations. First, it only studies Syrians that have fled the country and excludes those that are internally displaced. It also does not include data on those Syrians that have stayed. The literature suggests that there may be selection bias if there is a meaningful difference between those populations. Second, because of limitations in data availability, a citizen's proximity to violence is not studied. It assumes that citizens monitor violence in the entire country, while instead Syrians may experience different threats to their safety, depending on their location. Further research is required to gain a deeper understanding of migration processes in Syria and in other conflicts.

As the conflict in Syria continues, it becomes even more pressing to understand the factors affecting fluctuations in refugee flows. Using a lower level of temporal aggregation than previous scholarship and focusing on a single case tends to be more useful to policymakers seeking to apply a study's findings to the development of data-driven policies. Future research can help refugee camps most effectively plan for the food, shelter, medical, and educational needs of incoming refugees.

6. References

- Adhikari, Prakash. "The plight of the forgotten ones: Civil war and forced migration." *International Studies Quarterly* 56, no. 3 (2012): 590-606.
- . 2011. "Conflict-induced displacement, understanding the causes of flight." Doctor of Philosophy, Political Science, The University of New Mexico.
- Ahmad, Alhanaee and Dénes Csala, "Motives to Flee: Modelling the Syrian Refugee Crisis" Working Paper, Masdar Institute of Science and Technology, (2015).
- Apodaca, Clair. "Human Rights Abuses: Precursor to Refugee Flight?" *Journal of Refugee Studies* 1, no. 1 (1998): 80–93.
- Barnard, Anne. "Death Toll From War in Syria Now 470,000, Group Finds." The New York Times. February 11, 2016. Accessed October 1, 2016.
<http://www.nytimes.com/2016/02/12/world/middleeast/death-toll-from-war-in-syria-now-470000-group-finds.html>
- Birchall, Jenny. 2016. *Gender, age and migration: An extended briefing*. Institute of Development Studies, (2007).
- Bohra, Pratikshya, and Douglas Massey. "Processes of internal and international migration from Chitwan, Nepal." *International Migration Review* 43, no. 3. (2009): 621-651.
- Bohra-Mishra, Pratikshya, and Douglas Massey. Individual decisions to migrate during civil conflict. *Demography* 48, no. 2 (2011): 401-424.
- CARIM-South. "Evolution of the number of registered refugees from Syria in Jordan." (2015) Accessed September 21, 2016. <http://carim-south.eu/database/demo-eco->

module/evolution-of-the-number-of-registered-refugees-from-syria-in-jordan-19012012-to-23082015/.

Clark, Lance. "Early warning of refugee flows." *Refugee Policy Group*, (1989).

Davenport, Christian, Will Moore, and Steven Poe. "Sometimes you just have to leave: Domestic threats and forced migration, 1964-1989." *International Interactions* 29, no. 1 (2003): 27-55.

Deutsche Welle. "NGOs urge countries to take in Syrian refugees." August 12, 2014.

Accessed October 1, 2016. <http://www.dw.com/en/ngos-urge-countries-to-take-in-syrian-refugees/a-18115151>

Dobbs, Leo. "Funding shortage leaves Syrian refugees in danger of missing vital support." UNHCR. June 25, 2015. Accessed October 1, 2016.

<http://www.unhcr.org/en-us/news/latest/2015/6/558acbbc6/funding-shortage-leaves-syrian-refugees-danger-missing-vital-support.html>

Encyclopaedia Britannica. "Syrian Civil War." December 8, 2015.

Accessed October 1, 2016. <https://www.britannica.com/event/Syrian-Civil-War/Uprising-in-Syria-2011-12>

Georgiou, Harris V. "Identification of refugee influx patterns in Greece via model-theoretic analysis of daily arrivals." *Arxiv* (2016).

Human Rights Watch. "Syria: Chemicals Used in Idlib Attacks." April 13, 2015.

Accessed October 1, 2016. <https://www.hrw.org/news/2015/04/13/syria-chemicals-used-idlib-attacks>

- Ibáñez, Ana María and Carlos Eduardo Vélez. "Civil Conflict and Forced Migration: The Micro Determinants and Welfare Losses of Displacement in Columbia." *World Development* 36, no. 4 (2008): 659-676.
- Independent. "Syrian civil war timeline: Tracking five years of conflict." March 13, 2016. Accessed October 1, 2016. <http://www.independent.co.uk/news/world/middle-east/syrian-civil-war-timeline-tracking-five-years-of-conflict-a6929411.html>
- Kaufman, Chaim. "When All Else Fails: Ethnic Population Transfer and Partitions in the Twentieth Century." *International Security* 23, no. 2 (1998): 120-156.
- Masad, David. "Studying the Syrian civil war with GDELT." Caerus Analytics, (2013).
- Melander, Erik and Magnus Öberg. "Time to Go? Duration Dependence in Forced Migration." *International Interactions* 32, no. 2 (2006).
doi:10.1080/0305062060057483
- "The Threat of Violence and Forced Migration: Geographical Scope Trumps Intensity of Fighting." *Civil Wars* 9, no. 2 (2007):156–173.
- McKirdy, Euan. "UNHCR report: More displaced now than after WWII." CNN. June 20, 2016. Accessed October 1, 2016. <http://www.cnn.com/2016/06/20/world/unhcr-displaced-peoples-report/>
- Moore, Will, and Stephen Shellman. "Refugee or internally displaced person? to where should one flee?" *Comparative Political Studies* 39, (2006).
- "Fear of persecution." *Journal of Conflict Resolution* 48, no. 5 (2004): 723-745.
- "Whither Will They Go? A Global Study of Refugees' Destinations, 1965-1995" *International Studies Quarterly* 51, no. 4 (2007).

- Neumayer, Eric. "Bogus refugees? The Determinants of Asylum Migration to Western Europe." *International Studies Quarterly* 49, no. 4 (2005).
- Price, Megan, Anita Gohdes, and Patrick Ball. "Updated statistical analysis of documentation of killings in the Syrian Arab Republic." Human Rights Data Analysis Group, (2014).
- Richmond, Anthony H. "Sociological theories of international migration: The case of refugees." *Current Sociology* 36, no. 2 (1988).
- Schmeidl, Susanne. "Exploring the Causes of Forced Migration: A Pooled Time Series Analysis, 1971-1990." *Social Science Quarterly* 78, no. 2 (1997): 284-308.
- "From Root Cause Assessment to Preventive Diplomacy: Possibilities and Limitations of an Early Warning of Forced Migration." Unpublished dissertation, The Ohio State University (1995).
- Shellman, Stephen and Stewart, Brandon. "Predicting Risk Factors Associated with Forced Migration: An Early Warning Model of Haitian Flight." *Civil War* 9, no. 2 (2007). doi: 10.1080/13698240701207344
- Syrian Refugees. "The Syrian Refugee Crisis and its Repercussions for the EU." September 2016. Accessed October 1, 2016. <http://syrianrefugees.eu/>
- Trading Economics. "Jordan Consumer Price Index." October 2016. Accessed October 1, 2016. <http://www.tradingeconomics.com/jordan/consumer-price-index-cpi>
- Trading Economics. "Syria Consumer Price Index." October 2016. Accessed October 1, 2016. <http://www.tradingeconomics.com/syria/consumer-price-index-cpi>
- UNHCR. "Syria Regional Refugee Response." November 7, 2016. Accessed November 24, 2016. <http://data.unhcr.org/syrianrefugees/regional.php>

U.S. Department of State. "Syrian Refugee Response." November 22, 2016. Accessed October 1, 2016. <http://www.state.gov/j/prm/policyissues/issues/refugeerresponse/>

Violations Documentation Center in Syria. 2016. Accessed October 1, 2016. <http://www.vdc-sy.info/index.php/en/martyrs>

Zolberg, Aristide R., Suhrke, Astri, and Sergio Aguayo. 1989. *Escape from Violence: Conflict and the Refugee Crisis in the Developing World*. New York, NY: Oxford University Press, 1989.

7. Curriculum Vita

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