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The Impact of Syrian Refugees on the Labor Market in Neighboring Countries: Empirical Evidence from Jordan*

Ali Fakih†, May Ibrahim‡

Résumé/abstract

This paper analyzes time-sensitive data on a humanitarian crisis in the Middle East. It aims to assess the impact of the steep influx of Syrian refugees into Jordan on the country's labor market since the onset of the conflict in Syria (March 2011). As of August 2014, nearly 3 million registered Syrians have sought refuge in neighboring countries (Lebanon, Jordan, Iraq, and Turkey), according to the United Nations High Commissioner for Refugees (UNHCR). Jordan and Lebanon are hosting the majority of them. This paper utilizes data regarding unemployment rates, employment rates, labor force participation, the number of refugees, and economic activity at the level of governorates. The Vector Autoregressive (VAR) methodology is used to examine time series data from the most affected governorates in Jordan. The empirical results of Granger causality tests and impulse response functions show that there is no relationship between the influx of Syrian refugees and the Jordanian labor market. Our results are verified through a set of robustness checks.

Mots clés/keywords : Forced refugees; Host country; Labor market; VAR model

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† Department of Economics, Lebanese American University, P.O. Box: 13-5053, Chouran Beirut 1102 2801, Lebanon. Center for Interuniversity Research and Analysis on Organizations (CIRANO), Montreal, Canada. Institute for the Study of Labor (IZA), Bonn, Germany. Corresponding author. Phone number: +961-1786456. E-mail address: afakih@lau.edu.lb.

‡ World Bank, Beirut office, Bourie House 119, Abdallah Bayhum Street Marfaa – Solidere, P. O. Box: 11-8577, Beirut 1107 2270, Lebanon.

1. Introduction

Over the past three years, the world has faced one of the largest exoduses in recent history in the Syrian conflict that began in March 2011. One direct implication of this conflict is large-scale population displacement. Indeed, approximately 3 million Syrians have fled their country in search of a safe haven along the borders with the country's immediate neighbors, namely, Lebanon, Jordan, Turkey and Iraq.[1] Such a humanitarian crisis has prompted governments in these countries to receive and host refugees of different age groups, genders, religious affiliations and income levels. Lebanon and Jordan, which are currently hosting the majority of those refugees, have experienced substantial macroeconomic and social impacts as a result. Against this backdrop, this paper contributes to the migration and economics literature by examining the impact of refugee inflows on a neighboring country's economy by investigating the case of Syrian refugees in Jordan. We specifically study the effects of displacement on certain key labor market variables, such as unemployment rates, employment rates, and labor force participation.

According to the United Nations High Commissioner for Refugees (UNHCR) (2014), the number of Syrian refugees registered or awaiting registration in Jordan reached 604,868 in July 2014, representing approximately 10% of the Kingdom's population and 26% of total Syrian refugees in neighboring countries. The Jordanian government officially recognized the growing refugee crisis in 2012, when increased fighting in Syria forced an average of 1,000 refugees to cross the border each day. In response, the Zaatari refugee camp was set up in July 2012 in the northern part of the country. In July 2013, the number of refugees in the Zaatari camp was estimated to be 144,000, rendering it the second largest camp in the world and the fourth largest city in Jordan, according to data from the UNHCR.[2] UNHCR surveys (2013) indicate that not all Syrian refugees reside in camps, as some are hosted by their relatives (mostly in cities close to the Syrian border). Others rent apartments at low prices, whereas few have benefited from donated housing. UNHCR data indicate that Amman has the largest population of urban refugees (32% of the total), followed by Irbid (29%) and Zarqa (10%). Furthermore, data from home visits

[1] According to Gomez *et al.* (2010), approximately 75% of the world's refugees are displaced in neighboring countries that share land or maritime borders. Moreover, the largest percentage of forced refugees in the world is found in the Middle East and North Africa region.

[2] It is noteworthy that a large number of Palestinians and Iraqis are also registered as refugees, making Jordan the highest ranked country in the world in terms of refugees per capita (Olwan and Shiyab, 2012).

undertaken by UNHCR and International Relief and Development (IRD) between 2011 and 2013 indicate trends of high mobility among refugees, which renders it difficult to ensure traceability.

Given the disruptive nature of population displacements, assessing the impact of the influx of refugees into a certain country is imperative to understanding the changes, whether negative or positive, that the country on the receiving end can face, be they social, economic, demographic or political. The remainder of the paper is organized as follows. Section 2 describes the contextual setting. Section 3 presents the literature survey. Section 4 describes the data and the empirical methodology. Section 5 presents and discusses the empirical results. The final section presents brief concluding remarks.

2. Contextual Setting

This section provides an economic background on Jordan for the period 2011-2013 and describes the legal framework governing Syrian refugees in Jordan.

2.1. Economic Background (2011-2013)

Jordan is a small open economy located in the Middle East and North Africa (MENA) region; it is considered an upper middle income country, according to the World Bank. The Gross Domestic Product (GDP) was equal to US$ 33.68 billion (current value) in 2013. Jordan has faced a combination of economic challenges prior to the spillovers of the Syrian conflict and the influx of Syrian refugees into the country. Two main external shocks, the global financial crisis (2008/2009) and the turmoil that followed the Arab uprising in the region (2011), exacerbated the country's economic volatility. The Kingdom's economic challenges expanded after 2011, as it was forced to spend an additional US$ 2.5 billion per year to secure fuel and diesel from international markets at costly rates due to the steep reduction in supplies of less costly gas from Egypt, which was used to generate approximately 80% of the local electricity supply. The rise in international commodity prices and the use of expensive fuel products, as mentioned above, have led to the deterioration of Jordan's current account deficit, which reached 18% of GDP.

The steep influx of Syrian refugees into the country imposed an additional burden on the government in terms of public spending, especially on infrastructure needed to supply the additional demand for electricity, water and municipal services (approximately US$ 1.7 billion as

of October 2013).[3] These additional costs were incurred by the Jordanian government to meet the demand of hosting the large number of Syrian refugees on public services, as shown in Table 1. The annual cost of having a student enrolled in primary education is approximately US$ 877, whereas this number increases to approximately US$ 1,195 for a student enrolled at the secondary level. This resulted in an additional cost of US$ 81.4 million to enroll approximately 78,531 Syrian children in 2013. Moving to health services, we find that the annual cost of providing health services is approximately US$ 874 per patient per year, resulting in an additional total cost of approximately US$ 167.8 million for hosting approximately 600,000 Syrian refugees.[4] We also observe that every 10,000 people will require approximately 20 beds with a cost of US$ 197,700 per bed. Looking at the cost of providing and maintaining the water network, we note that the figure reaches approximately US$ 102.3 per person annually, resulting in additional costs of approximately US$ 62 million annually to cover the needs of Syrian refugees. Finally, to continue hosting Syrian refugees, municipalities that provide services such as electricity, road construction, and insecticides will also face additional challenges. According to the Jordanian government, the cost of providing such services is estimated to be approximately US$ 115.8 per person each year, totaling US$ 40.5 million annually.

In terms of unemployment, a marginal decline was registered from 12.9% in 2011 to 12.2% in 2012, and more recent figures from Jordan's Department of Statistics indicate a further decline to 11% in the last quarter of 2013. Government figures indicate that in many of the areas populated by refugees, more than 15% of the Jordanian population is unemployed. According to a recent study by the Food and Agriculture Organization (FAO) (2013)[5], the Syrian crisis has decreased domestic employment opportunities in the agricultural sector, which is considered a main source of income for 60% of Jordanians living in rural areas. The Ministry of Labor estimates that there are 30,000 Syrian children, mainly boys, currently engaged in child labor, with approximately 47% of the families who reported receiving income also reporting that children who had entered the workforce provided part or all of this income. In addition to agriculture, young boys who are

[3] Impact of Hosting Syrian Refugees, Ministry of Planning and International Cooperation, 2013.
[4] Approximately 32% of the population admits to receiving health services that are subsidized by the government. Thus, taking into account the total numbers of Syrian refugees in the country, the health system will accommodate approximately 192,000 Syrian patients (Impact of Hosting Syrian Refugees, Ministry of Planning and International Cooperation, 2013).
[5] Agricultural Livelihoods and Food Security Impact Assessment and Response Plan for the Syria Crisis in the Neighboring Countries of Egypt, Iraq, Jordan, Lebanon and Turkey, Food and Agriculture Organization, 2013.

acknowledged to be working are mainly employed in construction, the service industry, and retail, whereas young girls are more likely to be involved in domestic work and agriculture, which imposes additional concerns related to child labor and exploitation or abuse.

2.2. Legal framework governing Syrian refugees in Jordan

Jordan was long considered to be a destination for Syrian workers and workers from other neighboring countries such as Iraq and Egypt. The different crises that have occurred in the region over the past decade (i.e., the Iraq War in 2004 and the current Syrian conflict) brought a large number of refugees to Jordan. According to Olwan and Shiyab (2012), Syrian refugees in Jordan are treated as foreign nationals and are subject to national laws that govern their entry, residence, and departure because Jordan does not have an explicit law to address issues related to refugees. Indeed, Jordan is not a signatory to the UN 1951 Geneva Convention that governs the situation of refugees, but it does treat all refugees under its Alien Law. Nevertheless, the country does collaborate with the UNHCR to help refugees under an agreement, and a memorandum of understanding (MOU) was signed between the two parties in 1997 and 2003 (Olwan and Shiyab, 2012). Accordingly, Syrian refugees can enter Jordan without a visa or a residence permit. Theoretically, refugees can remain in Jordan for only six months, in which case it is the responsibility of the UNHCR to find a resettlement country;[6] it is also the responsibility of the UNHCR to define the refugees' status in the absence of such a determination mechanism in Jordan. Despite these constraints, Syrian refugees in Jordan have access to public health services, their children can attend school for free, they are included in the food voucher program, and finally, they are eligible for the cash assistance program. Syrian refugees are not legally allowed to work in Jordan and are not entitled to work permits from the Ministry of Labor.[7] However, a recent report by the Jordanian government and the UN concludes that '*The expectation is that Syrian refugees will, over time, develop more contacts and relationships with Jordanian employers in host communities, and make progressive inroads into informal employment*'. The report indicates that, in 2013, approximately 160,000 Syrians were working illegally in the Kingdom for low wages. These workers were observed mainly in informal agriculture, construction, and food services.

[6] UNHCR Global Appeal Update: Jordan, 2013.
[7] International Labour Organization (ILO), Regional Office for the Arab States, Mission Report, 2013.

Table 2 shows the number of registered Syrian refugees and an estimate of the potential active labor force of Jordanians and refugees in the most affected governorates. Jordan had a population of approximately 6.3 million people in 2013. The Amman, Irbid and Zarqa governorates are the three largest governorates in Jordan, constituting 71.4% of the total population.[8] Nearly 61% of the registered Syrian refugees were located in these three governorates. Additionally, these three governorates have the highest ratios of Syrian refugees to Jordanians and the highest refugee density. Irbid contains the highest refugee density and has the second largest population in Jordan after the Amman governorate; interestingly, however, it does not contain the largest Syrian refugee population even though it is the closest to the Syrian border. We also observe that Syrian refugees represent approximately 6.7%, 12.2%, and 6.9% of the total potential active labor force in Amman, Irbid and Zarqa, respectively. These governorates have Syrian refugees who are distributed in camps and in urban areas. Figure 1 displays the movements of refugees from Syria to Jordan and the locations of the Amman, Irbid and Zarqa governorates. The closest governorate to the Syrian border is Irbid, which is located in the North region next to the Syrian border. The Amman governorate (includes the capital city) borders the Zarqa governorate, which is the third largest governorate in Jordan by population. Both Amman and Zarqa are located in the Central region.

3. Related Literature

The economics literature on the effects of forced migration, particularly in host countries, is still relatively undeveloped. Forced migration flows occur because of a variety of causal factors, including, for example, persecution, natural and industrial disasters, environmental degradation, war and conflict, ethnic discrimination, and human rights violations (Mason, 2000). It has been shown that violence due to war and conflict has greater effects on the level of forced migration than any other factors, including economic problems or political instability (Schmeidl, 1997; Moore and Shellman, 2004). There is ample evidence that governments are inclined to conduct indicative assessments to evaluate the economic and social burdens that these host countries have to shoulder due to the influx of refugees and the increase in hosting costs (Chatty and Marfleet,

[8] Jordan is geographically divided into 12 provinces called governorates, and each one includes districts and sub-districts. These governorates are distributed over three regions: the North region, the Central region, and the South region.

2013). This influx comes on the back of already hard-pressed public budgets and public services, which generally results in increased population, stunted economic growth, strained political structures, heightened tensions among host communities and environmental degradation, and increased crime and insecurity (Hein, 1993; Murdoch and Sandler, 2002; Whitaker, 2002; Alix-Garcia and Saah, 2010; Reuveny et *al.*, 2010; Gomez *et al.*, 2010).

Ruiz and Vargas-Silva (2013) review the literature exploring the impact of forced migration, focusing on both forced migrants and host communities. Their paper concludes that the long-term impact of forced migration due to events related to World War II has been positive for many displaced groups. The reasons behind these positive outcomes include effective resettlement policies, increased future mobility for those who were displaced and faster transition to other sectors for agricultural workers. The authors observe that the long-term mobility of forced migrants is key in determining their long-term outcomes. However, the abovementioned finding is true for European countries. In the case of developing countries, the authors show that the consequences of forced migration lead to degenerate outcomes ranging from negative labor market outcomes to less income and less consumption smoothing. On the receiving end, i.e., the host communities, the findings are both negative and positive. In some cases, winners are identified, such as agricultural producers, who are able to take advantage of the cheaper labor force represented by forced migrants, and the increase in demand for products (and potential increase in prices). Losers include local workers who have lost their jobs due to the supply of cheaper labor following the influx of job-seeking refugees and more vulnerable hosts (children) who may face long-term health consequences.

The effects of refugees on labor market outcomes in host countries can be related to the wider literature estimating the impact of immigration on the host country's labor market. Empirical studies conclude that immigrants exert a modest impact on labor market outcomes of native-born workers (Friedberg and Hunt, 1995). Specifically, empirical evidence shows that the effects on employment levels of natives are very low, whereas wages are negatively affected, but only slightly. For example, D'Amuri *et al.* (2010) study the impact of immigrants on the western German labor market. They find that immigrants to Germany in the 1990s had modest effects on wages and employment levels of Germans. They also find that the new immigrants had no effect on the employment of natives; however, there was a negative impact on the employment of old

immigrants. The authors conclude that there is close competition among immigrants but not between immigrants and natives. In contrast, Borjas (2003) finds strong results suggesting that immigrants to the US reduced the employment of natives. He shows that an increase of 10% in the influx of immigrants resulted in a decrease in the number of weeks worked by approximately 2% for native-born workers who had the same skills. More recently, Manacorda *et al.* (2012) find that, for the same education and skills group, immigration reduced the wages of previous immigrants but with a weak effect on the wages of native-born workers in the UK. They argue that these results appear to suggest that immigrants and native-born workers are imperfect substitutes in production. By the same token, Ottaviano and Peri (2012) also conclude that natives and immigrants are imperfect substitutes in the US. Specifically, they show that immigration had a positive impact on the wages of natives but that the effect was small. However, there was a substantial negative effect on the wages of earlier immigrants. In his seminal work, Chiswick (1978, 1986) argues that refugees' lack of education and labor market experience creates problems in signaling their skills. Moreover, these workers are characterized as having lower motivation compared to economic migrants, as well as lower skills, which makes it difficult for them to perform highly on the labor market. They are thus less likely to have transferable skills in the labor market.

It has been documented that developing countries that host refugees for protracted periods experience long-term economic, social, political, and environmental effects (Gomez *et al.*, 2010). Baez (2011) notes that developing countries receiving a sudden and large number of refugees from neighboring countries may face the problem of overpopulation, which leads to higher competition for resources in the host country. De Groot (2010) mentions that neighboring countries suffering from the spillover effects of conflict are likely to host the bulk of refugees, which negatively influences economic growth through the destruction of productive labor. According to De Groot (2010), refugees in neighboring countries are attracted to less-productive activities. Bah (2013) notes that refugees' flows urge the host country to provide more necessary public services, which leads to increased resource scarcity. However, refugees may positively influence the country's economic growth if they have a high level of human or physical capital or because of the increase in international aid flows to the host country. However, for Chambers (1986), refugees are likely to reduce the employment of locals by driving down wages and thus putting locals out of a source of income. Kondylis (2010) finds that displaced men and women from Bosnia and Herzegovina are less likely to be employed than those who stayed. It is worth mentioning that refugees forced

to move due to wars and conflicts do not migrate in search of work opportunities. In other words, they are non-economic migrants, and their migration is push-driven rather than pull-driven (Ruist, 2013). Thus, there is less correlation between the influx of refugees and labor market outcomes in the host country.

In his literature review on migration in Africa, Lucas (2006) notes that approximately three-quarters of African refugees from Sub-Saharan Africa remained in the region. The paper shows that Djibouti, Zambia, Guinea, Ghana, and Tanzania are among the largest countries that received refugees in terms of their ratio to the population. He argues that the effects of refugees in these countries were also similar to those observed in developed economies. Arthur (1991) finds that the labor market in urban areas in Ghana did not absorb the rapid flows of refugees from other African countries, which resulted in a dramatic increase in the size of informal sectors and unskilled workers. By the same token, Zetter and Deikun (2010) note that refugees living in urban areas tend to increase competition with locals in the labor market, leading to conflict with the communities in destination countries such as Malawi. Maystadt and Verwimp (2014) find that forced refugees moving to Tanzania from Burundi (the neighboring country that witnessed the genocides of Burundi and Rwanda in 1994) provided cheap labor, resulting in an increased labor supply. Indeed, refugees helped small and medium firms find workers. Chaulia (2003) finds that the first wave of Burundi refugees to Tanzania had positive effects on the labor market by providing cheap workers in the agricultural sector. This could be explained by the government's policy to open the market without restrictions to integrate these refugees. The effects of forced migration on the labor market in host countries were also empirically examined in other economic regions. For example, Calderón and Ibañez (2009) show that internal forced migration in Colombia had a more important effect in the informal sector labor market than in the formal sector. For example, they find that an increase in the stock of refugees by 10% causes wages to fall by 3%. They also find that the large flows of refugees had a negative impact on employment opportunities of particularly low-skilled workers.

In the case of Jordan and the challenges that the Kingdom has been facing since the onset of the conflict in Syria, a recent study conducted by Lozi (2013) investigates the effects of both Syrian and Iraqi refugees on Jordan. Using foreign direct investment and food pricing, the author concludes that the presence of refugees increased the food prices in Jordan. Moreover, the study

indicates that refugees in Jordan have had an impact on the national budget (leading to an expansionary budget in 2012) due to the considerable increase in school enrollment, use of public hospitals for health care, and the upsurge in consumption of government-subsidized fuel and water. Moreover, Lozi (2013) concludes that the effects of refugees were overstated in terms of positive and negative effects, indicating that refugees could not be held accountable for most of the economic challenges in Jordan. Another study by Olwan and Shiyab (2012) seeks to qualitatively examine the social, economic, and legal conditions of the Syrian refugees hosted in the Kingdom. It also observes the role of the government in hosting Syrian refugees and providing immediate relief, highlighting the challenges that the Jordanian government faces as a result, especially in vital sectors such as healthcare, housing, education, as well as the need for cash assistance. Zetter (2012) considers that the concept of refugee burden has become widely used by governments and relief agencies. He concludes that governments tend to emphasize the adverse effects and costs of hosting refugees, but these effects, although undeniable and well documented, are only part of the story. He further argues that refugees can expand the productive capacity of the host economy by increasing consumption, which is measured as a percentage of the country's GDP. However, such results are more likely to materialize in the long run according to Zetter (2012).

Finally, in the aftermath of the 2003 war in Iraq, Saif and DeBartolo (2007) qualitatively examine the effects of the war, and the influx of Iraqi refugees, on inflation and growth rates in Jordan. The paper concludes that the Iraq war had important effects on inflation in Jordan due to the increase in prices of food, fuel and real estate. However, the paper also notes that on the other hand, displaced Iraqis in Jordan affected growth and inflation rates far less than what was speculated and reported. The study underlines that the Iraq war had indeed caused inflation in Jordan to surge; however, by taking into account the governorates in which Iraqi refugees were hosted (mostly located in the capital city Amman) and the breakdown of inflation by governorate, the indicators showed that the inflation rates in Amman between 2002 and 2005 and in 2006 were lower than the rate of inflation across the entire country. The study further elaborates that rural areas in Jordan were mostly affected by inflation, whereas the service sector in Amman (hotels, restaurants, etc.) benefited from the spending of Iraqi refugees.

4. Data and Empirical Methodology

4.1. Data

The data used for this study cover the three main governorates of Jordan (i.e., Amman, Irbid and Zarqa) that host the vast majority of registered Syrian refugees. The data are sourced from Jordan's Department of Statistics, the Central Bank of Jordan, and the UNHCR. We retrieve the following variables: 1) the number of Syrian refugees in Jordan extracted from the UNHCR, 2) a variable for the economic activity measured by construction permits for housing units from the Central Bank of Jordan, and 3) labor market variables from Jordan's Department of Statistics. The number of Syrian refugees in thousands (*SYR*) in Jordan, i.e., the stock of refugees recognized by the UNHCR, covers the period between January 2012 and December 2013, observed monthly, at the level of the three governorates (Amman, Irbid and Zarqa). Baez (2011) uses a similar variable when studying the impact of hosting refugees fleeing from the genocides of Burundi and Rwanda on human capital and health consequences of children in Tanzania. He argues that this variable helps to capture the variation in refugees intensity when examining their effects and implications. He also notes that forced refugees in most cases are due to wars and conflicts leading to a massive population shock. This allows to study the effects of this structural variation in the population on economic conditions in the host country. This stock variable does not take value zero during the most of period of the study since the arrival of refugees in the host country is not a one-time shock, i.e. it starts from the first cohort of registered refugees and continues as conflicts exist in the country of origin.

Economic activity (*ECON*) captured by the percentage change in the number of construction permits (in thousands of square meters) is used as a control variable for economic activity. This variable is also observed on a monthly basis, covering the period January 2012-December 2013, at the level of the three governorates. It is defined as the percentage change from the prior month. Mayer and Somerville (2000) note that construction of new buildings affects overall output directly and indirectly because the owners of the new buildings will consume other durable goods. Baumohl (2012) argues that a country's economic activity can be examined by looking at the volume of permits issued for construction.

Finally, labor market indicators (*L*) include three variables. First, employment rates (*EMP*) (in percentage) are defined as the employment to population ratio, i.e., the ratio of the total working age of the labor force to the total working age of the population in the country excluding all refugees. Second, the unemployment rate (*UNEMP*) (as a percentage) is defined as the share of the labor force that is without work but that is actively looking for work. Third, labor force participation (*LFORCE*) (in percentage) is defined as the share of the population aged 15 years and above that is economically active.[9] Due to the unavailability of monthly data for labor market variables at the level of the governorates, we use a geometric interpolation technique to obtain the monthly figures from quarterly data. This allows us to observe the data at the same frequencies and have the same number of observations and the same coverage period as the *SYR* and *ECON* variables. Thus, in the estimations, we match the monthly observations on Syrian refugees with the monthly observations on *ECON* and *L* variables.[10] Examining Table 3 shows that the average unemployment rate is approximately 12.6%. The averages of the employment and labor force participation rates are approximately 34.2% and 39.1%, respectively.

4.2. Empirical methodology

To examine the response of macroeconomic variables (ECON, L) to variations in the influx of Syrian refugees (SYR), we resort to the Vector Autoregressive (VAR) model. Sims (1980) notes that VAR models have the advantage of using the macroeconomic variables in order to characterize the joint dynamic behavior of the time-series without imposing strong restrictions to identify the estimated parameters. Even when some applications of the VAR estimates, such as the impulse response functions (IRFs), require identification restrictions, this is done in a more systemic way. In other words, the restrictions are imposed only on the dynamic relationships between a pair of variables that could be hidden in the standard econometrics models. In our paper, the application of the VAR model is in line with the literature examining the impact of immigration on

[9] Labor market variables are drawn from the "Employment Survey" conducted by the Jordan's Department of Statistics. This survey provides data on the number of establishments and the number of workers in the public sector, in addition to various economic activities in the private sector. However, this survey excludes those working in the armed forces, public security, and civil defense. This survey is representative of the entire population of workers. Specifically, the survey collects data on workers from 1) all firms employing 50 people or more, 2) 50% of firms having 35-49 workers, 3) 20% of firms with 10-24 employees, and 4) 10% of firms employing 1-9 persons.

[10] We also run the empirical investigation using the quarterly data for the labor market variables covering the period Q4:2007-Q4:2013. This allows us to obtain the same number of observations as the monthly data for Syrian refugees and construction permits. Even though the variables are observed at different frequencies, the results remain qualitatively similar.

macroeconomic indicators and economic conditions in the host country (see, for example, the recent work of Boubtane et al., 2013a, 2013b; Damette and Fromentine, 2013).[11] These studies argue that there might be an endogenous relationship between the inflow of immigrants and the economic conditions and labor market in the host countries. This means that migrants may have an impact on the economic conditions in the host country, but also economic situations in the host country may have an influence on the flows of migrants. Thus, the VAR approach is an appropriate framework to address the potential endogeneity problem by considering the variables to be endogenous in the system. This helps to avoid making ad hoc assumptions about the variables of the system (Marr and Siklos, 1994) as in the case of instrumental variables. Another advantage of the VAR model is the isolation of the effects of macroeconomic variables on the inflow of immigrants. Our VAR approach is therefore used because it provides a means to examine the impact of the influx of Syrian refugees on the labor market in the host country (Jordan), capturing the linear interdependencies or Granger-type causality among the variables.

The VAR model provides a multivariate framework in which all variables are treated symmetrically. A VAR system contains a set of *n* time series variables $X_t = (X_{1t}, X_{2t}, ..., X_{nt})$, where each is expressed as a linear function of *p* lags of itself and of all of the other *n–1* variables as follows:

$$X_t = a_0 + a_1 X_{t-1} + a_2 X_{t-2} + \ldots a_p X_{t-p} + \varepsilon_t;\ t = 1, \ldots,\ T \qquad (1)$$

The VAR model used here focuses on three variables, where X_t = (SYR_t, $ECON_t$, L_t) is the vector of stationary variables. These variables are modeled together as endogenous variables. a_0 is the intercept vector of the VAR, a_i $(n \times n)$ are the coefficient matrices, and $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t}, ..., \varepsilon_{nt})$ denotes the independent and identically distributed disturbance terms of the VAR system. We can then represent equation (1) as a VAR system of equations through which Syrian refugees, economic activity, and labor market are considered endogenously:

$$SYR_t = a_{01} + \sum_{i=1}^{n} \alpha_{1i} SYR_{t-i} + \sum_{i=1}^{n} \lambda_{1i} ECON_{t-i} + \sum_{i=1}^{n} \delta_{1i} L_{t-i} + \varepsilon_{1t} \qquad (2)$$

[11] For example, Boubtane et al. (2013a) use a similar VAR framework with three variables which are the immigration rate, GDP per capita in the host country as proxy for economic conditions, and labor market indicators in the host country measured by the: total unemployment rates, total employment rates, native-born unemployment rates, and foreign-born unemployment rates.

$$ECON_t = a_{02} + \sum_{i=1}^{n} \alpha_{2i} SYR_{t-i} + \sum_{i=1}^{n} \lambda_{2i} ECON_{t-i} + \sum_{i=1}^{n} \delta_{2i} L_{t-i} + \varepsilon_{2t} \quad (3)$$

$$L_t = a_{03} + \sum_{i=1}^{n} \alpha_{3i} SYR_{t-i} + \sum_{i=1}^{n} \lambda_{3i} ECON_{t-i} + \sum_{i=1}^{n} \delta_{3i} L_{t-i} + \varepsilon_{3t} \quad (4)$$

where α, λ, δ are the parameters to be estimated; i is the lag length; and the subscript t represents time.

Three VAR systems have thus been estimated. Each VAR has been labeled as follows: VAR_1 (*SYR, ECON, UNEM*), VAR_2 (*SYR, ECON, EMP*) and VAR_3 (*SYR, ECON, LFORCE*). Each VAR model allows for the measurement of Granger causality between the number of Syrian refugees, economic activity, and labor market in Jordan. It should be noted that the structures of these VARs are similar in terms of interpretation and order of variables. The only difference is that we use three different measures for labor market outcomes. Granger causality between the variables can be investigated through a joint Wald Chi-square test applied to the coefficients associated with the lagged variables in one equation. Table 4 presents the testable relationship in each VAR model, where the general null hypothesis is the absence of a causal relationship between the variables. In each case, a rejection of the null implies the existence of a Granger causality relationship.

The VAR system can be transformed into a moving average representation to examine the system's response to a shock in the number of Syrian refugees as follows:

$$X_t = \beta + \sum_{i=0}^{\infty} \Psi_i \varepsilon_{t-i} \quad (5)$$

where Ψ_0 is the identity matrix and β is the mean of the process:

$$\beta = (I_p - \sum_{i=1}^{p} A_i)^{-1} c \quad (6)$$

where A_i is the i^{th} (3×3) matrix of autoregressive coefficients with *i = 1,2,...,p*, and $c = (c_1, c_2, c_3)$ is the (3×1) intercept vector of the VAR. The application of the moving average representation allows for the impulse response functions to be obtained. The IRFs are used to analyze how shocks to any variable filter through the model to affect every other variable. Specifically, the IRFs capture the effect of an innovation in a given variable on other variables, including its own. The innovation

is captured by a one-time shock in the error terms in our VAR model presented in equations (2)-(4). The usual convention is to select a particular ordering of variables in which those that appear earlier are more exogenous, whereas the variables that appear later are more endogenous. To obtain the IRFs, the Cholesky decomposition of the estimate of the variance-covariance matrix has been deployed, and the order is selected as such (*SYR*, *ECON*, *L*). This method results in a lower triangular matrix with positive main diagonal elements, in which we impose the following exclusion restrictions on contemporaneous responses in the system given by equations (2)-(4):

$$A = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix} \tag{7}$$

This ordering is selected because the Syrian refugee variable (i.e., the first variable) is the only variable with a potential instantaneous impact on economic activity and the labor market variables. Thus, the two market variables (*ECON* and *L*) are ranked as depending on the immediate impact of *SYR* causing *ECON* and *L* to be ranked below *SYR*. The ranking between *ECON* and *L* is indeed motivated by the fact that *ECON* has a more general impact on the total output than *L* does and can be observed as a variable related to the country's overall economic activity. Specifically, this ordering indicates that the Syrian refugee variable affects all other variables instantaneously, but economic activity (i.e., the second variable) and labor market (i.e., the third variable) may have an immediate impact on the last n−2 components of X_t but not on the first component. It is worth mentioning that Syrian refugees come to Jordan because of conflict and war in Syria, not because of the economic conditions in Jordan. Thus, it is likely that the impact of Syrian refugees on economic activity and the labor market is more immediate than the reverse.

5. Empirical Results

Our first objective before estimating the VAR models is to investigate the stationarity properties of the time-series data used to determine the order of integration. This is important to ensure that we obtain unbiased results from the Granger causality tests. To examine the stationarity properties of the variables, we run the Augmented Dickey-Fuller (ADF) test (1981); the Phillips-Perron test (PP) (1988); the Im, Pesaran and Shin (IPS) test (2003); and the ADF-Fisher test

proposed by Maddala and Wu (1999). The null hypothesis for these tests is the presence of non-stationarity, i.e., the existence of a unit root. If some or all of the variables in the model are non-stationary, hypothesis testing and the confidence intervals will be unreliable. Table 5 reports the results of the stationarity tests at the level of each of the variables; the results show that the null hypothesis of the unit root for all variables is rejected at the 1% significance level for all variables except for the *UNEMP* variable, which is rejected at the 5% significance level in the ADF-Fisher test. This finding indicates that the *SYR*, *ECON*, and *L* variables are all stationary at level and can be used in the estimation. It is therefore concluded that all the variables used in this study are integrated of order zero and are used in the estimation without taking their first difference.

The VAR lag lengths are chosen optimally to pass the residual tests of no serial correlation, normality, and no heteroscedasticity to ensure that the estimation is robust. For this purpose, the Breusch-Godfrey Lagrange multiplier test (LM test) is used for serial correlation, multivariate extensions of the Jarque-Bera test for detecting normality, and the White test for heteroscedasticity. The null hypotheses for these tests indicate, respectively, that the residuals are not serially correlated, are normal, and are not heteroscedastic. The null hypothesis is rejected at the 5% significance level or lower. The results, shown in Table 6, indicate that the residuals for VARs *1, 2* and *3* are neither serially correlated nor heteroscedastic. However, normality, using Cholesky decomposition, cannot be confirmed for VAR_2 and VAR_3. The optimal lag length for VAR_1 and VAR_2 is 5, and for VAR_3, the optimal lag length is 4. Based on the results of these tests, we proceed with VARs *1, 2* and *3* using Cholesky orderings.

Next, the Granger causality tests and impulse response functions are examined for the three VARs in levels. Table 7 presents the results for the Granger causality tests for VARs *1, 2* and *3*. Figures 2, 3, and 4 provide the IRFs for standard deviation shocks of each endogenous variable to its own innovation and to the innovation of other variables for the same VARs, using the Cholesky decomposition method with the benchmark ordering *SYR, ECON, L*.

We run the Granger causality tests for VARs *1, 2* and *3*, respectively. The Chi-square statistics along with their *p*-values are shown. The results indicate the absence of Granger causality running from the influx of Syrian refugees to labor market variables (unemployment, employment, and labor force participation). The results cannot reject the hypothesis of no causality in each case, except in the case of the labor force variable in VAR_3, where we find a unidirectional causality

running from the labor force variable to the influx of Syrian refugees. This latter result can explain the post-migration decision of refugees to stay in Jordan or leave to a third host country.

The results of the Granger tests provide evidence that Syrian refugees do not show relationships with the labor market in Jordan. This result is in line with the findings of Ruist (2013) indicating that there is no significant effect of refugees on total unemployment in Sweden and the results of Arthur (1991) from Ghana. This result can also be related to the wide literature estimating the impact of immigration on the host country's labor market and conclude that immigrants exert a modest impact on labor market outcomes of native-born workers in host countries. It could be possible that host countries are taking additional measures to prohibit firms from hiring these refugees. For example, in November 2013, Jordan made the decision to deport 5,723 illegal Syrian workers in an effort to regulate the labor market and give priority to unemployed Jordanians.[12] It is also possible that Syrian refugees are attracted and forced to participate in informal employment because in the formal sector it is very difficult to obtain work permits. Additionally, in the informal sector, refugees provide cheap labor in sectors such as agriculture, construction, housekeeping, and catering, thereby mainly affecting the wages of non-skilled workers (Maystadt and Verwimp, 2014). Alternatively, temporary refugees in developing countries are generally located in low-income and fragile border regions and camps with tight movement restrictions in the countries neighboring their country of origin, as in the case of Jordan. This may result in restraining access to local labor market (Gomez *et al.*, 2010). Finally, it is possible that Syrian refugees have low skills that are not suitable for the jobs available in neighboring countries (see, for the example, the Colombian case discussed in Calderón *et al.*, 2011).

To examine the response of macroeconomic variables to positive or negative shocks in the influx of Syrian refugees, we run the impulse response functions. The middle lines in the figures represent the impulse response functions, whereas the bands represent for the 95% confidence intervals for the IRFs. Thus, when the horizontal line falls within the confidence interval, then the null hypothesis indicating that there is no effect of Syrian refugees on labor market variables cannot be rejected. Including the horizontal line for the particular time period is interpreted as evidence of the absence of statistical significance.

[12] Fair Observer, Local Perceptions on Syrian Refugees, 2014.

Figure 2 shows the results for the VAR_1 (unemployment rate) system. The results show that the response of unemployment to a shock in the influx Syrian refugees is not statistically significant, i.e., we fail to reject the null hypothesis that there is no effect of Syrian refugees on unemployment. Additionally, the results indicate that the economic variable (construction permits) does not significantly affecting unemployment. We also find that there is no significant impact on construction permits to a shock in Syrian refugees. With respect to the VAR_2 (employment rate) system illustrated in Figure 3, the results also show that there is no evidence of a significant impact on employment or construction permits in response to a shock in the Syrian refugee variable. A small positive and significant impact on employment is observed in response to a shock in economic proxy, i.e., in construction permits. However, the response dies out quickly and becomes statistically insignificant. This effect could be due to weak linkages between the employment rate and economic activity because a sizable fraction of the labor sector is in the informal sector, whereas the public sector is a major source of employment. Evidence obtained from the VAR_3 (labor force participation) system, as shown in Figure 4, indicates that the impact of a shock in the number of Syrian refugees does not have a significant impact on labor force participation. Additionally, the results show that a shock to the number of Syrian refugees on construction permits is also insignificant. For statistical robustness, Figures A1, A2, A3 of the Appendix present different orders of the variables in the Cholesky decomposition (*ECON, SYR, L*), demonstrating similar results in the IRFs. Taken together, the impulse response functions confirm the Granger causality analysis in that the influx of Syrian refugees does not seem to affect the Jordanian labor market.

5.1. Validity checks

In this section, we first run the VAR model separately by governorate. Second, we use an alternative model based on the panel Vector Autoregressive model (PVAR).

Tables 8, 9, and 10 show the results for Amman, Irbid and Zarqa, respectively. Overall, the results are observed to be in conformity with those derived from the benchmark analysis, demonstrating that there are no effects running from Syrian refugees to the labor market in Jordan. Interestingly, we find that there is a unidirectional causal relationship running from unemployment to Syrian refugees in Irbid and Zarqa, the closest governorates to Syrian borders. In Amman, there is strong evidence that economic activity affects the flows of Syrian refugees, suggesting that

refugees may prefer to be located in the capital city, which offers a higher possibility of finding a job than the governorates located on the border do.

Next, we run a panel VAR model proposed by Holtz-Eakin *et al.* (1988). This model allows us to increase the number of observations spanning over a relatively short time period by pooling the time series data across the three governorates, which leads to higher power for the causality tests. This may solve the problem related to the short observation period because a long observation period for Syrian refugees is not currently available. An important advantage of the PVAR model is that is considers jointly cross-sectional and time series dependencies. Moreover, the PVAR model is considered to be superior to the pooled Ordinary Least Squares (OLS), fixed effects (FE), and random effects (RD) models because this model is not subject to the omitted bias problem found in those models (Love and Zicchino, 2006). Instead, the PVAR model assumes that all variables are endogenous. Table 11 presents the PVAR estimation results. The table shows the results of VARs *1, 2* and *3*. We find that the response of the labor market variables in each VAR specification to the flows of Syrian refugees is not statistically significant, again confirming the absence of a relationship between the influx of Syrian refugees and the Jordanian labor market.

6. Conclusion

Understanding the effects of hosting refugees on the local economy is important with respect to implementing effective responses to humanitarian crises. This paper investigates the impact of Syrian refugees on the labor market in Jordan. The magnitude of the Syrian conflict implies a flow of forcibly displaced persons that is unprecedented in the region, with potentially long-lasting spillover effects on neighboring countries that must be understood to inform international policies related to the conflict as well as to design strategies for the post-conflict situation.

Using data on employment rates, unemployment rates, and labor force participation, the VAR estimations that have been conducted show that Syrian refugees do not have a significant impact on the labor market in Jordan. This main result holds against a set of robustness checks. Specifically, the absence of a relationship between an influx of Syrian refugees and labor market outcomes in Jordan is also found when running the model by governorate and when using an alternative empirical specification based on a panel VAR model. Evidence from the impulse response functions suggests the possibility that employment and labor force participation rates

exert negative and borderline effects on Syrian refugees, which may indicate that the host society is not creating employment opportunities for refugees.

Among alternative explanations to these results, one could include the possibility that i) host countries are taking additional measures to prohibit firms from hiring these refugees, ii) refugees are forced to work in the informal sector, which does not require work permits, iii) forced refugees are located in border regions and camps with tight movement restrictions, and iv) refugees have low skills that are not suited to the jobs available in the host countries. The absence of evidence on the impact of Syrian refugees on the labor market in Jordan could also be related to the wide literature estimating the impact of immigration on the host country's labor market. Empirical studies conclude that immigrants exert a modest impact on labor market outcomes of native-born workers. Evidence from this literature suggests that immigrants and native-born workers indeed appear to be imperfect substitutes.

Constraints on data availability for all governorates of Jordan in addition to insufficient proxies for economic activity limited the testing to three governorates only (Amman, Irbid and Zarqa). However, these governorates represent the three largest cities in Amman, comprising 71.4% of the total population. Exposure to the influx of Syrian refugees is highest in Irbid (29% of urban refugees) because it is situated in the north, where the country shares common borders with war-torn Syria. Amman, the political and commercial capital, is home to the highest population and currently hosts the largest percentage of urban refugees (32%). These governorates thus characterize the forces that this paper seeks to capture.

Nonetheless, the gravity of the humanitarian crisis, and the negative socio-economic impact of such an alarming exodus, must not be underestimated. International aid to Jordan is still crucial in facing the increasing burdens of the presence of Syrian refugees in the Kingdom to address the additional demand for electricity, water, and public services. As more data become available, including detailed micro-level data, further studies must be conducted to have longer-term assessments of the employment conditions in Jordan, allowing for more variation across time and for some potential shocks over the period covered. By the same token, it would be interesting if future research examined employment outcomes by sector. One can argue that the labor market in Jordan is stratified by national origin (natives, immigrants, and refugees) and that an overall analysis of the labor market might suppress the relations that the refugee influx has in some specific

sectors of the labor market, particularly those at the bottom of the labor structure. Finally, it would be interesting for future research to examine the impact of Syrian refugees on the other neighboring countries, i.e., Lebanon, Turkey and Iraq.

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Tables

Table 1 Costs incurred by the government of Jordan in response to the influx of Syrian refugees

Type of Public Service	**Cost**
Primary education	US$ 877 (annually/per student enrolled)
Secondary education	US$ 1,195 (annually/per student enrolled)
Healthcare services	US$ 874 (annually/per patient)
Hospitalization services (every 10,000 persons need approximately 20 beds)	US$ 197,000 (per bed)
Urban water delivery	US$ 102.30 (annually/per person)
Running and maintaining municipal services (electricity, construction of roads, insecticides)	US$ 115.80 (annually/per person)

Source: Impact of Hosting Syrian Refugees, Ministry of Planning and International Cooperation, 2013.

Table 2 Registered Syrian refugees and estimates of active labor force in the highly affected governorates, 2014

	Jordanian Population	**Registered Refugees**	**Refugee Density**	**Active Labor Force**	
				Jordanians	*Syrian Refugees*
Amman	2,473,400	164,297	0.067	604,897	41,426
Irbid	1,137,100	139,716	0.115	292,325	35,690
Zarqa	951,800	66,624	0.073	202,843	14,063
Total	4,562,300	370,637	-	1,100,065	91,179
Jordan	6,388,000	604,868	0.095	-	-

Source: Needs Assessment Review of the Impact of the Syrian Crisis on Jordan, Ministry of Planning and International Cooperation and United Nations, 2013 and UNHCR, 2014.

Table 3 Summary statistics of labor market variables

	Unemployment (%)	Employment (%)	Labor force participation (%)
Mean	12.6	34.2	39.1
Maximum	14.3	35.8	41.2
Minimum	10.8	32.5	37.3
Std. Dev.	0.8	0.7	0.9

Table 4 Testable Granger causal relationships

Causal flow	Null hypotheses
(1) $ECON \rightarrow SYR$	all $\lambda_{1i} = 0$
(2) $L \rightarrow SYR$	all $\delta_{1i} = 0$
(3) $SYR \rightarrow ECON$	all $\alpha_{2i} = 0$
(4) $L \rightarrow ECON$	all $\delta_{2i} = 0$
(5) $SYR \rightarrow L$	all $\alpha_{3i} = 0$
(6) $ECON \rightarrow L$	all $\lambda_{3i} = 0$

Table 5 Unit root tests of variables in levels

	H_0: Variable has unit root			
Variables	ADF test	PP test	Im, Pesaran and Shin test	ADF-Fisher test
SYR	0.0020***	0.0000***	0.0001***	0.0005***
ECON	0.0010***	0.0030***	0.0001***	0.0001***
UNEMP	0.0000***	0.0000***	0.0043***	0.0122**
EMP	0.0000***	0.0000***	0.0004***	0.0016***
LFORCE	0.0000***	0.0000***	0.0001***	0.0005***

Notes: Figures in brackets represent *p*-values. *** indicates rejection of the null hypothesis at the 1% level. ** indicates rejection at the 5% level. * indicates rejection at the 10% level.

Table 6 VAR residual tests

	LM Test †		Jarque-Bera ‡		White Test ‡	
	H_0:No serial correlation		H_0: Normal		H_0: No heteroscedasticity	
Ordering VAR	Stat	Prob.	Stat	Prob.	Stat.	Prob.
VAR_1: SYR, ECON, UNEM	10.9275	0.2807	3.4970	0.7443	4.3000	0.1381
VAR_2: SYR, ECON, EMP	11.0032	0.2754	11.4230	0.0761*	1.2100	0.2713
VAR_3: SYR, ECON, LFORCE	7.9553	0.5386	7.95530	0.0191**	0.9600	0.3273

Notes: † For each VAR estimated we only consider the LM-Stat and probability of the first lag length. ‡ We only consider the joint test and not each component individually. *** indicates rejection of the null hypothesis at the 1% level. ** indicates rejection at the 5% level. * indicates rejection at the 10% level.

Table 7 Granger causality tests

	VAR$_1$: SYR, ECON, UNEM		**VAR$_2$:** SYR, ECON, EMP		**VAR$_3$:** SYR, ECON, LFORCE	
	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value
Null hypotheses						
ECON does not Granger cause *SYR*	0.4994	0.4800	0.4082	0.5230	0.0386	0.8440
L does not Granger cause *SYR*	2.6743	0.1020	19.2300	0.6832	10.8490	0.0010***
SYR does not Granger cause *ECON*	0.0001	0.9940	0.2809	0.5960	0.0955	0.7570
L does not Granger cause *ECON*	0.5476	0.4590	2.6704	0.1020	2.1737	0.1400
SYR does not Granger cause *L*	1.9055	0.1670	0.0045	0.9460	0.5892	0.4430
ECON does not Granger cause *L*	1.5531	0.2130	2.8702	0.1900	1.1258	0.2890

Notes: *** indicates rejection of the null hypothesis at the 1% level. ** indicates rejection at the 5% level. * indicates rejection at the 10% level.

Table 8 Granger causality tests (Sample: Amman governorate)

	VAR$_1$: SYR, ECON, UNEM		**VAR$_2$:** SYR, ECON, EMP		**VAR$_3$:** SYR, ECON, LFORCE	
	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value
Null hypotheses						
ECON does not Granger cause *SYR*	3.6197	0.0570*	3.4910	0.0620*	3.6688	0.0550*
L does not Granger cause *SYR*	0.1556	0.6930	0.3208	0.5710	0.1657	0.6840
SYR does not Granger cause *ECON*	0.4460	0.5040	1.3227	0.2500	2.3020	0.1290
L does not Granger cause *ECON*	0.0017	0.9680	0.8330	0.3610	1.7549	0.1850
SYR does not Granger cause *L*	0.0665	0.7960	0.9196	0.3380	1.5614	0.2110
ECON does not Granger cause *L*	0.3109	0.5770	2.0848	0.1490	1.6529	0.1990

Notes: *** indicates rejection of the null hypothesis at the 1% level. ** indicates rejection at the 5% level. * indicates rejection at the 10% level.

Table 9 Granger causality tests (Sample: Irbid governorate)

	VAR$_1$: SYR, ECON, UNEM		**VAR$_2$:** SYR, ECON, EMP		**VAR$_3$:** SYR, ECON, LFORCE	
	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value
Null hypotheses						
ECON does not Granger cause *SYR*	5.1747	0.0230**	2.4651	0.1160	2.5682	0.1090
L does not Granger cause *SYR*	3.9899	0.0460**	0.0025	0.9600	0.5112	0.4750
SYR does not Granger cause *ECON*	0.7101	0.3990	4.0851	0.0430**	3.4975	0.0610*
L does not Granger cause *ECON*	9.8442	0.0020***	0.0023	0.9620	1.3509	0.2450
SYR does not Granger cause *L*	1.8185	0.1770	0.0313	0.8600	1.6587	0.1980
ECON does not Granger cause *L*	3.2981	0.0690*	1.8480	0.1740	0.0690*	0.7930

Notes: *** indicates rejection of the null hypothesis at the 1% level. ** indicates rejection at the 5% level. * indicates rejection at the 10% level.

Table 10 Granger causality tests (Sample: Zarqa governorate)

	VAR$_1$: SYR, ECON, UNEM		**VAR$_2$:** SYR, ECON, EMP		**VAR$_3$:** SYR, ECON, LFORCE	
	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value	Chi-square statistic	*p*-value
Null hypotheses						
ECON does not Granger cause *SYR*	1.8088	0.1790	0.7824	0.3760	0.5826	0.4450
L does not Granger cause *SYR*	13.1940	0.0000***	0.5202	0.4710	0.0915	0.7620
SYR does not Granger cause *ECON*	0.7948	0.3730	0.5307	0.4660	2.9454	0.0860*
L does not Granger cause *ECON*	2.6376	0.1040	0.1184	0.7310	2.2902	0.1300
SYR does not Granger cause *L*	0.0478	0.8270	1.7579	0.1850	0.6482	0.4210
ECON does not Granger cause *L*	0.6789	0.4100	0.7341	0.3920	3.6792	0.0550*

Notes: *** indicates rejection of the null hypothesis at the 1% level. ** indicates rejection at the 5% level. * indicates rejection at the 10% level.

Table 11 Estimation results (Panel VAR)

Response of	Response to		
VAR₁	SYR	ECON	UNEMPL
SYR	-1.9567	-0.0016	0.0201
	(2.7291)	(0.0017)	(0.0265)
ECON	-287.3172	0.2671	4.9680
	(704.3054)	(0.7098)	(10.9207)
UNEMPL	-155.2264	-0.1084	1.2892
	(269.2886)	(0.1838)	(2.8561)
VAR₂	SYR	ECON	EMPL
SYR	3.4020	0.0014	-0.0341
	(5.6450)	(0.0043)	(0.0614)
ECON	114.2548	0.3981	-1.2402
	(699.2702)	(0.6181)	(7.4599)
EMPL	187.1251	0.1019	-1.8976
	(277.7811)	(0.1895)	(2.9517)
VAR₃	SYR	ECON	LFORCE
SYR	4.3895	0.0020	-0.0666
	(9.1524)	(0.0064)	(0.1428)
ECON	-164.9383	0.2587	3.0010
	(512.6015)	(0.6877)	(8.3659)
LFORCE	202.2825	0.1138	-3.1173
	(392.0009)	(0.2593)	(6.1115)

Notes: Statistical significance: *=10%; **=5%; ***=1%. Robust standard errors are shown in parentheses.

Figures

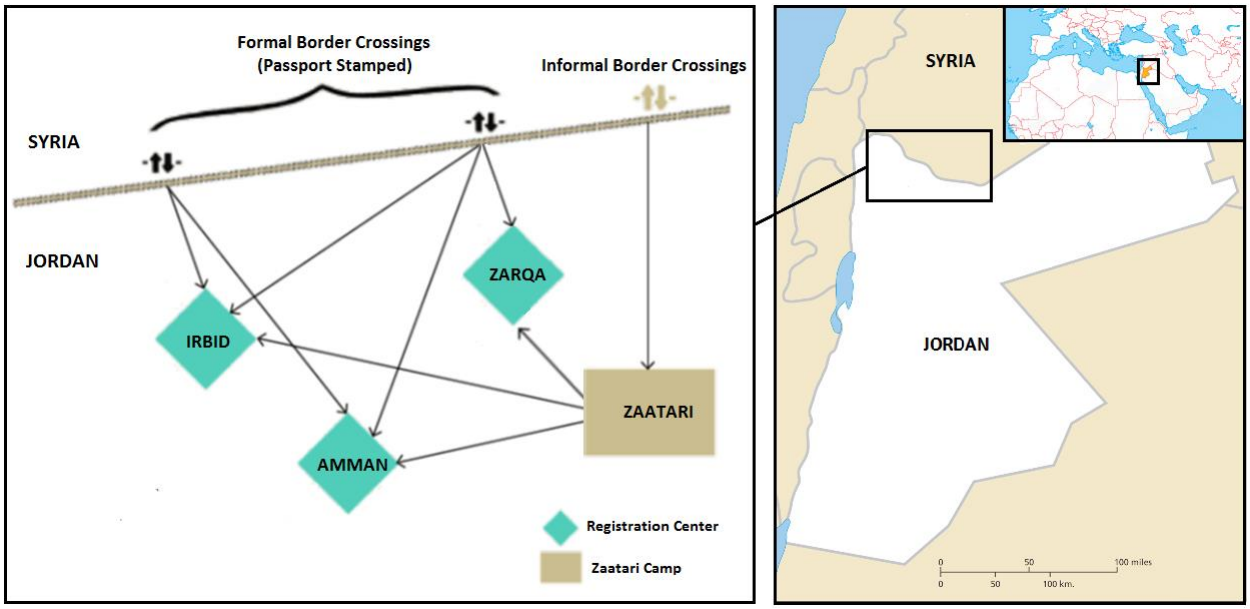

Figure 1 Border crossing and registration of Syrian refugees to Jordan
Source: Syrian Refugees Living Outside Camps in Jordan, UNHCR, 2013.

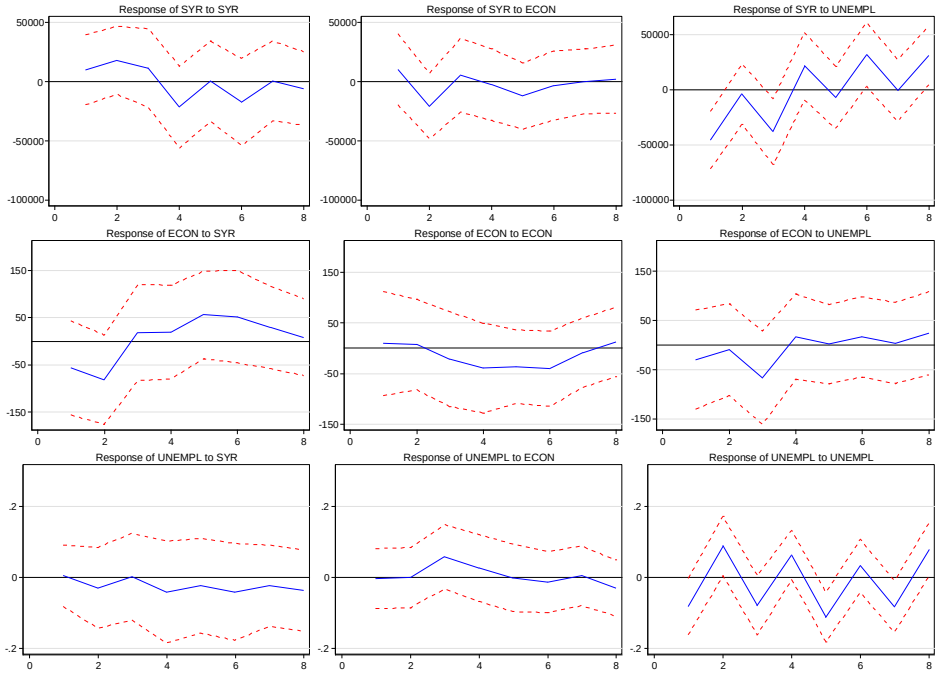

Figure 2 Impulse Response Function for VAR_1 (SYR, ECON, UNEMP)

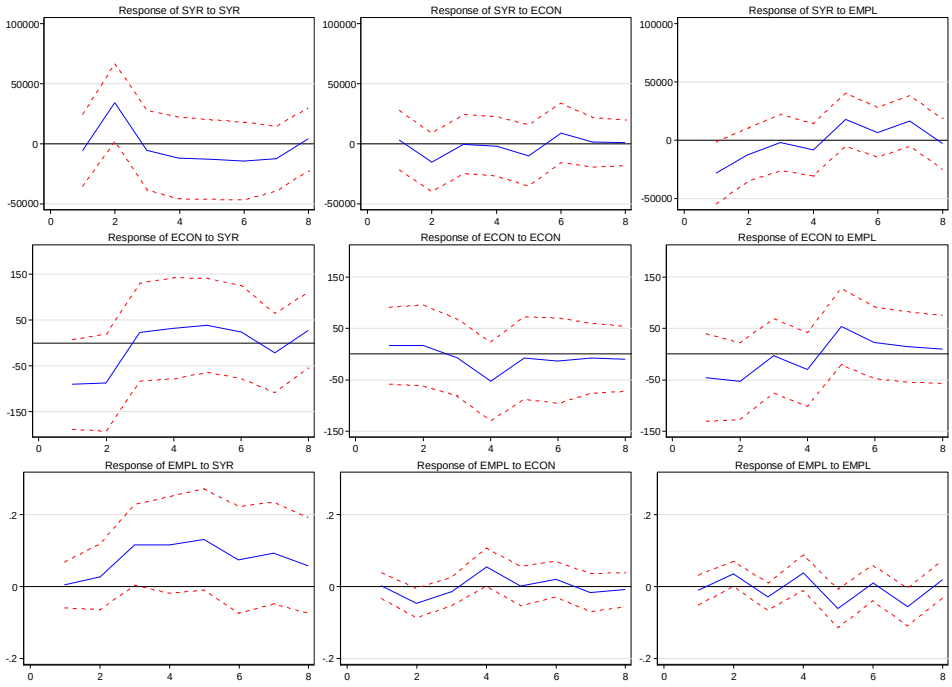

Figure 3 Impulse Response Function for VAR_2 (SYR, ECON, EMP)

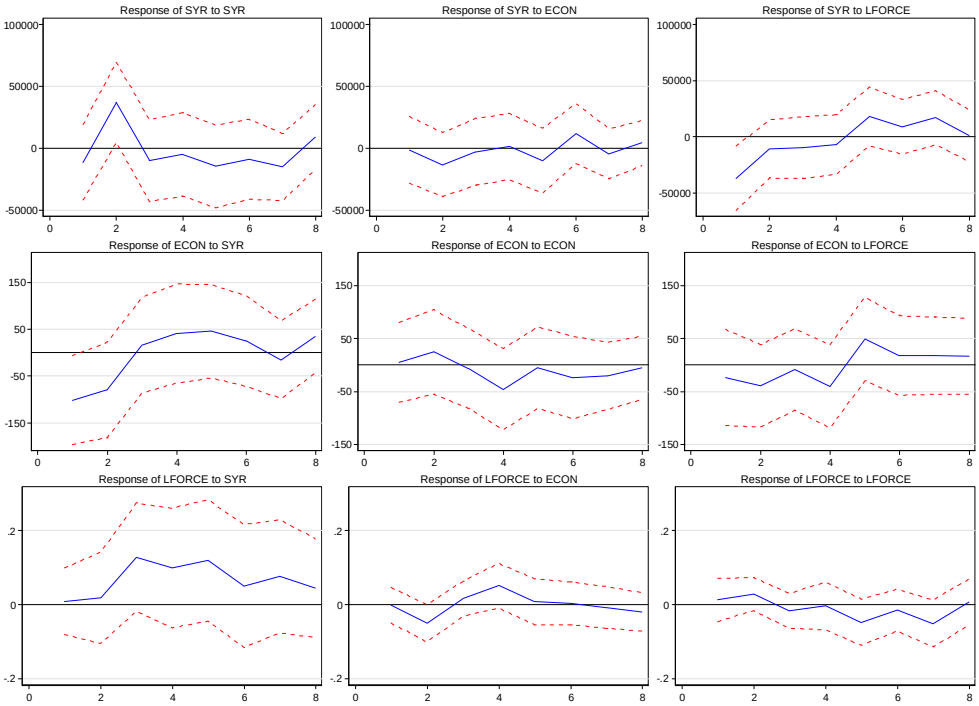

Figure 4 Impulse Response Function for VAR_3 (SYR, ECON, LFORCE)

Appendix

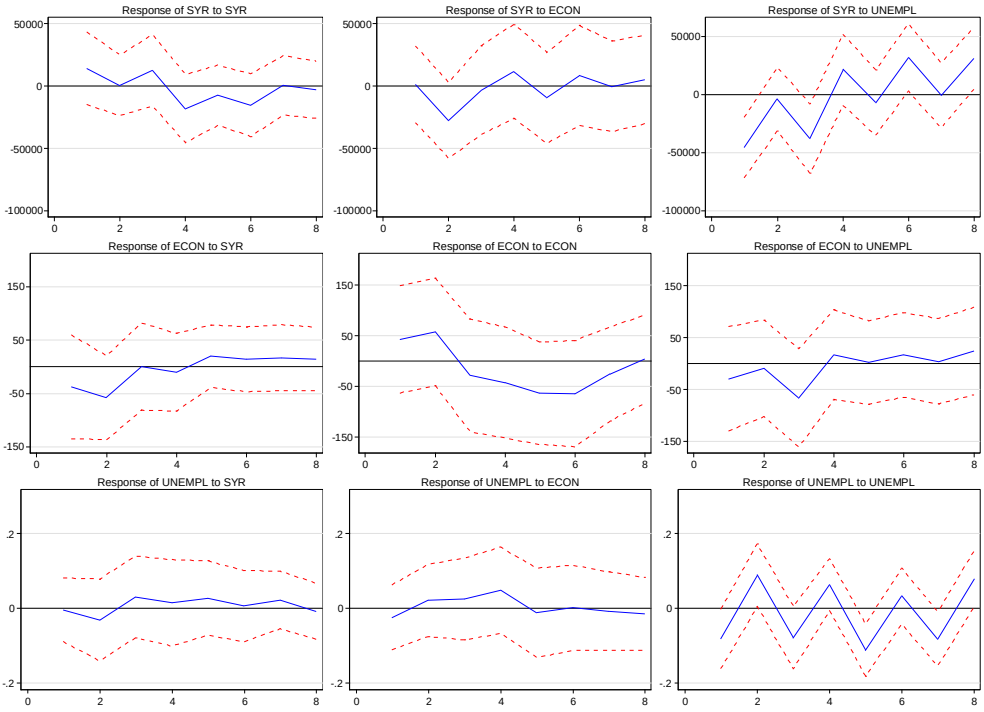

Figure A1: Impulse Response Function for VAR_1 (ECON, SYR, UNEMP)

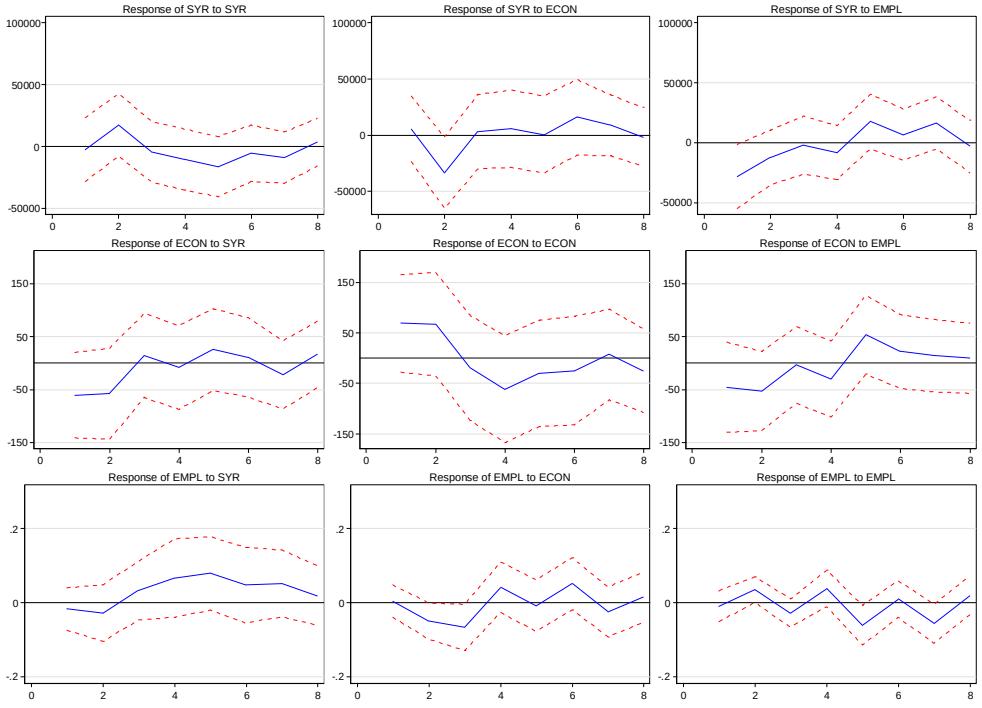

Figure A2: Impulse Response Function for VAR_2 (ECON, SYR, EMP)

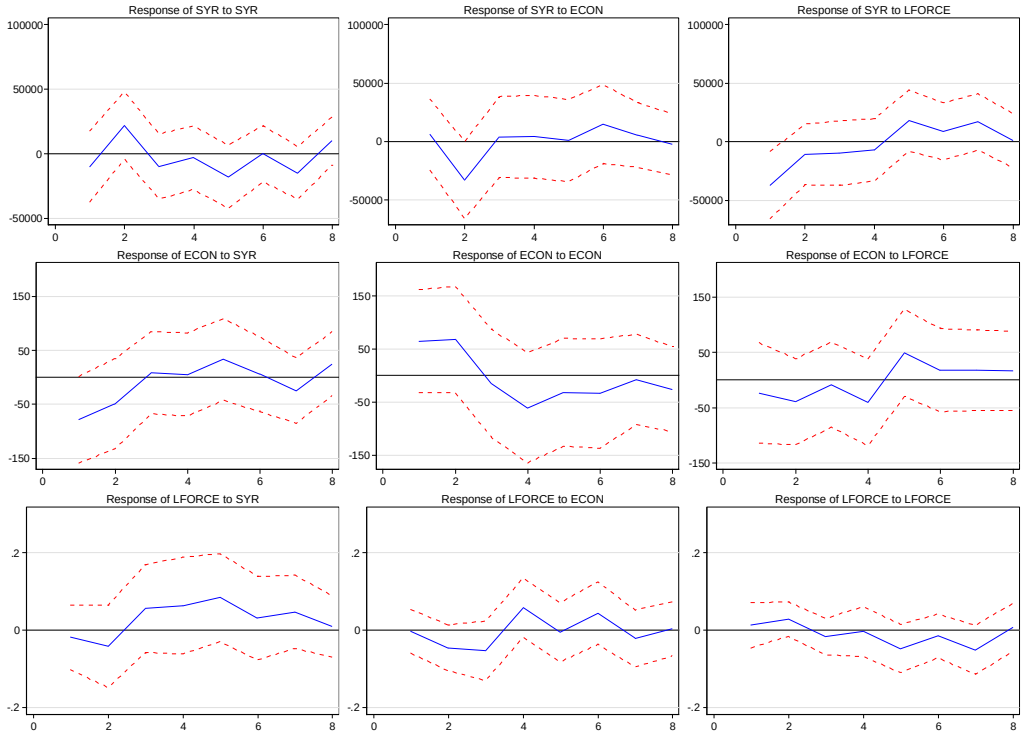

Figure A3: Impulse Response Function for VAR_3 (ECON, SYR, LFORCE)

1130, rue Sherbrooke Ouest, bureau 1400, Montréal (Québec) H3A 2M8

Tél. : 514-985-4000 • Téléc. : 514-985-4039

www.cirano.qc.ca • info@cirano.qc.ca

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