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Refugee Crisis and its Impact on Crime Trends in Germany

Taisiia Stanishevska and Nimantha Manamperi*

Department of Economics, St. Cloud State University
St Cloud, MN 56301, USA

Abstract: This paper analyzes the effect of refugee influx on crime rates in Germany. An autoregressive distributed lag model (ARDL) is used for the long run relationship and a vector error correction model (VECM) is used for the short run relationship. Results indicate a positive significant effect of refugee influx on total crime rates in the long run, however no significant effect is detected for the short run. The impact of refugees on violent crime rate is found to be insignificant in both long run and short run.

Keywords: Refugees, Crime Rate, Germany, ARDL, VECM

JEL Classification Number: J6, C32, F22

1. Introduction

The refugee crisis in Europe has been a major source of debate and controversy over the recent years. In the midst of this debate, Germany has been accepting the largest number of refugees among other European countries, which has a significant influence on country's economy and social structure. The phenomenon of "Wirschaffen das" (We'll manage it by Chancellor Angela Merkel) draws further attention to Germany, which consistently helps refugees to find a new home despite criticism and lack of support from other European countries. However, the question of how Germany will manage the recent refugee influx does not have a definite answer. The impact of immigrants on the national economy including economic growth and unemployment has been studied extensively (Felbermayr, Hiller and Sala, 2010). However the impact of immigrants on crime trends has not been given much attention. The different circumstances leading refugees and economic immigrants to Germany imply a completely different experience for them in their new country, which in turn, translates into differences in criminal behavior. It is important to provide a closer look at refugee population since the majority of refugees are coming from the areas where violence can be part of daily routine, which is crucial in determining how likely a person is to commit a crime (Couttenier et al., 2016; Damm and Dustmann, 2014). Therefore the concentration on refugees' influence on crime trends in a country where the refugee crisis is reaching its peak provides important information to improve the quality of integration courses and to ensure safety of the citizens living in a multicultural society.

* Corresponding author. Email: npmanamperi@stcloudstate.edu

2. Data Description

The econometric framework for this paper is based on the social disorganization model and control theory on macro level predictors of crime rate. According to social disorganization model, low socioeconomic status, residential mobility, family disruption and unsupervised peer groups can lead to higher crimes (Sampson and Groves, 1989). The control theory identified an individual's lack of bonding to society as an increasing factor of crime (Hirschi, 1969). South and Messner (2000) identified age, especially younger individuals, as a determining factor of crime. We enhance the above models by incorporating refugees as a factor of crime. The unemployment rate, growth rate of refugees, growth rate of individuals aged 16-26 years, growth rate of number of higher education students and growth rate of number of divorces were used as proxy variables for socioeconomic status, ethnic heterogeneity, age, education level and family disruption respectively. The primary dependent variable is the growth rate of total crime. We also extended our analysis by considering an additional dependent variable, the growth rate of violent crime[1].Annual time series data from 1976-2015 was obtained from several sources including the Federal Criminal Police Office of Germany and the Office of the United Nations High Commissioner for Refugees.

3. Empirical Specification

Based on the above discussion on social disorganization model and control theory, the crime rate can be represented as a function of the following factors.

$$Crime\ rate = f(refugees, divorces, education, unemployment, youth) \quad (1)$$

The Zivot and Andrews unit root test is used to determine the stationarity of variables as Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests fail to account for structural break in data (Zivot and Andrews 1992). The regression equation is as follows:

$$\Delta y_t = \mu + \beta t + \rho y_{t-1} + \delta D1_t + \delta D2_t + \sum_{i=1}^{n} c_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

Where $D1_t$[2] and $D2_t$[3]indicate break dummy variables for a mean shift and a trend shift. The shift occurs at each potential break point T_{Break} $(1 < T_{Break} < T)$. The number of lags, n, is determined by Akaike Information Criteria (Akaike, 1974). The null hypothesis is H_0: $\rho = 0$; series exhibits a unit root and excludes any structural break points and the alternative hypothesis is H_a: $\rho < 0$; series is stationary with an unknown one time break.

[1] Violent crime includes murder, manslaughter, rape, aggravated sexual coercion, robberies, dangerous and serious bodily injuries.

[2] $D1_t=1$ if $t>T_{Break}$, otherwise $D1_t=0$

[3] $D2_t=t - T_{Break}$ if $t>T_{Break}$, otherwise $D2_t=0$

The presence of cointegration between variables is tested with autoregressive distributive lag model (Pesaran, Shin, and Smith, 2001). The following ARDL model equations are used to identify the cointegration and the long run effect between variables.

$$\begin{aligned}\Delta\, ln\ Crime_t =\ & \beta_0 + \beta_{crime}\, lnCrime_{t-1} + \beta_{ref}\, Ref_{t-1} \\ & + \beta_{divor}\, Divor_{t-1} + \beta_{educ}\, Educ_{t-1} + \beta_{unempl}\ Unempl_{t-1} \\ & + \beta_{yout\ h} Youth_{t-1} + \textstyle\sum_{a=1}^{f} \beta_a \Delta lnCrime_{t-a} + \sum_{b=0}^{g} \beta_b \Delta Ref_{t-b} \\ & + \textstyle\sum_{c=0}^{h} \beta_c \Delta Divor_{t-c} + \sum_{d=0}^{i} \beta_d \Delta Educ_{t-d} + \sum_{e=0}^{j} \beta_e \Delta Unempl_{t-e} \\ & + \textstyle\sum_{g=0}^{k} \beta_g \Delta Youth_{t-g} + \beta_{dummy}\ D1_t + \varepsilon_t \end{aligned} \qquad (3)$$

$$\begin{aligned}\Delta\, Ref_t =\ & \alpha_0 + \alpha_{crime}\, lnCrime_{t-1} + \alpha_{ref}\, Ref_{t-1} + \alpha_{div}\, Divor_{t-1} \\ & + \alpha_{educ}\, Educ_{t-1} + \alpha_{unempl}\ Unempl_{t-1} + \alpha_{yout\ h} Youth_{t-1} \\ & + \textstyle\sum_{a=0}^{f} \alpha_a \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \alpha_b \Delta Ref_{t-b} + \sum_{c=0}^{h} \alpha_c \Delta Divor_{t-c} \\ & + \textstyle\sum_{d=0}^{i} \alpha_d \Delta Educ_{t-d} + \sum_{e=0}^{j} \alpha_e \Delta Unempl_{t-e} \\ & + \textstyle\sum_{g=0}^{k} \alpha_g \Delta Youth_{t-g} + \alpha_{dummy}\ D1_t + \varepsilon_t \end{aligned} \qquad (4)$$

$$\begin{aligned}\Delta\, Divor_t =\ & \rho_0 + \rho_{crime}\, lnCrime_{t-1} + \rho_{ref}\, Ref_{t-1} + \rho_{div}\, Divor_{t-1} \\ & + \rho_{educ}\, Educ_{t-1} + \rho_{unempl}\ Unempl_{t-1} + \rho_{yout\ h} Youth_{t-1} \\ & + \textstyle\sum_{a=0}^{f} \rho_a \Delta lnCrime_{t-a} + \sum_{b=0}^{g} \rho_b \Delta Ref_{t-b} + \sum_{c=1}^{h} \rho_c \Delta Divor_{t-c} \\ & + \textstyle\sum_{d=0}^{i} \rho_d \Delta Educ_{t-d} + \sum_{e=0}^{j} \rho_e \Delta Unempl_{t-e} + \sum_{g=0}^{k} \rho_g \Delta Youth_{t-g} \\ & + \rho_{dummy}\ D1_t + \varepsilon_t \end{aligned} \qquad (5)$$

$$\begin{aligned}\Delta\, Educ_t =\ & \omega_0 + \omega_{crime}\, lnCrime_{t-1} + \omega_{ref}\, Ref_{t-1} + \omega_{div}\, Divor_{t-1} \\ & + \omega_{educ}\, Educ_{t-1} + \omega_{unempl}\ Unempl_{t-1} + \omega_{yout\ h} Youth_{t-1} \\ & + \textstyle\sum_{a=0}^{f} \omega_a \Delta lnCrime_{t-a} + \sum_{b=0}^{g} \omega_b \Delta Ref_{t-b} + \sum_{c=0}^{h} \omega_c \Delta Divor_{t-c} \\ & + \textstyle\sum_{d=1}^{i} \omega_d \Delta Educ_{t-d} + \sum_{e=0}^{j} \omega_e \Delta Unempl_{t-e} + \sum_{g=0}^{k} \omega_g \Delta Youth_{t-g} \\ & + \omega_{dummy}\ D1_t + \varepsilon_t \end{aligned} \qquad (6)$$

$$\begin{aligned}\Delta\, Unempl_t =\ & \gamma_0 + \gamma_{crime}\, lnCrime_{t-1} + \gamma_{ref}\, Ref_{t-1} + \gamma_{div}\, Divor_{t-1} \\ & + \gamma_{educ}\, Educ_{t-1} + \gamma_{unempl}\ Unempl_{t-1} + \gamma_{yout\ h} Youth_{t-1} \\ & + \textstyle\sum_{a=0}^{f} \gamma_a \Delta lnCrime_{t-a} + \sum_{b=0}^{g} \gamma_b \Delta Ref_{t-b} + \sum_{c=0}^{h} \gamma_c \Delta Divor_{t-c} \\ & + \textstyle\sum_{d=0}^{i} \gamma_d \Delta Educ_{t-d} + \sum_{e=1}^{j} \gamma_e \Delta Unempl_{t-e} \\ & + \textstyle\sum_{g=0}^{k} \gamma_g \Delta Youth_{t-g} + \gamma_{dummy}\ D1_t + \varepsilon_t \end{aligned} \qquad (7)$$

$$\Delta\, Youth_t = \varphi_0 + \varphi_{crime}\, lnCrime_{t-1} + \varphi_{ref}\, Ref_{t-1} + \varphi_{div}\, Divor_{t-1} + \varphi_{educ}\, Educ_{t-1} + \varphi_{unempl}\, Unempl_{t-1} + \varphi_{yout\,h} Youth_{t-1} + \sum_{a=0}^{f} \varphi_a \Delta lnCrime_{t-a} + \sum_{b=0}^{g} \varphi_b \Delta Ref_{t-b} + \sum_{c=0}^{h} \varphi_c \Delta Divor_{t-c} + \sum_{d=0}^{i} \varphi_d \Delta Educ_{t-d} + \sum_{e=0}^{j} \varphi_e \Delta Unempl_{t-e} + \sum_{g=1}^{k} \varphi_g \Delta Youth_{t-g} + \varphi_{dummy}\, D1_t + \varepsilon_t \qquad (8)$$

Where $lnCrime\ rate_t$ is the natural log of total offenses recorded, $lnViolent\ crime\ rate_t$ is the natural log of total violent offenses recorded, Ref_t is the annual percentage rate of total number of refugees, $Unempl_t$ is unemployment rate, $Divor_t$ is the annual percentage rate of total number of divorces, $Youth_t$ is the annual percentage rate of total number of individuals aged 16-26 years, $Educ_t$ is the annual percentage rate of total number of higher education students and $D1$ is a dummy variable reflecting the separation and reunification of Germany[4] in 1990. It is assumed that $\varepsilon_t \sim N(0, \sigma^2)$. The appropriate lag structure is based on Akaike Information Criteria. The stability of the ARDL coefficients is evaluated using cumulative sum (CUSUM) and cumulative sum of squares ($CUSUM_{sq}$) tests and the results are presented in figure 1.

The short run relationship is analyzed using the following vector error correction model.

$$\Delta\, ln\, Crime_t = \beta_{01} + \sum_{a=1}^{f} \beta_{11} \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \beta_{22} \Delta Ref_{t-b} + \sum_{c=1}^{h} \beta_{33} \Delta Divor_{t-c} + \sum_{d=1}^{i} \beta_{44} \Delta Educ_{t-d} + \sum_{e=1}^{j} \beta_{55} \Delta Unempl_{t-e} + \sum_{g=1}^{k} \beta_{66} \Delta Youth_{t-g} + \beta_{02} Dummy_t + \pi_1 ECM_{t-1} + \mu_{1t} \qquad (9)$$

$$\Delta\, Ref_t = \alpha_{01} + \sum_{a=1}^{f} \alpha_{11} \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \alpha_{22} \Delta Ref_{t-b} + \sum_{c=1}^{h} \alpha_{33} \Delta Divor_{t-c} + \sum_{d=1}^{i} \alpha_{44} \Delta Educ_{t-d} + \sum_{e=1}^{j} \alpha_{55} \Delta Unempl_{t-e} + \sum_{g=1}^{k} \alpha_{66} \Delta Youth_{t-g} + \alpha_{02} Dummy_t + \pi_2 ECM_{t-1} + \mu_{2t} \qquad (10)$$

$$\Delta\, ln\, Divor_t = \rho_{01} + \sum_{a=1}^{f} \rho_{11} \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \rho_{22} \Delta Ref_{t-b} + \sum_{c=1}^{h} \rho_{33} \Delta Divor_{t-c} + \sum_{d=1}^{i} \rho_{44} \Delta Educ_{t-d} + \sum_{e=1}^{j} \rho_{55} \Delta Unempl_{t-e} + \sum_{g=1}^{k} \rho_{66} \Delta Youth_{t-g} + \rho_{02} Dummy_t + \pi_3 ECM_{t-1} + \mu_{3t} \qquad (11)$$

$$\Delta\, Educ_t = \omega_{01} + \sum_{a=1}^{f} \omega_{11} \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \omega_{22} \Delta Ref_{t-b} + \sum_{c=1}^{h} \omega_{33} \Delta Divor_{t-c} + \sum_{d=1}^{i} \omega_{44} \Delta Educ_{t-d} + \sum_{e=1}^{j} \omega_{55} \Delta Unempl_{t-e} + \sum_{g=1}^{k} \omega_{66} \Delta Youth_{t-g} + \omega_{02} Dummy_t + \pi_4 ECM_{t-1} + \mu_{4t} \qquad (12)$$

[4] D1=0 if 1976≤t≤1990;D1=1 if 1991≤t≤2015.

$$\Delta\, Unempl_t = \gamma_{01} + \sum_{a=1}^{f} \gamma_{11} \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \gamma_{22} \Delta Ref_{t-b} + \sum_{c=1}^{h} \gamma_{33} \Delta Divor_{t-c} + \sum_{d=1}^{i} \gamma_{44} \Delta Educ_{t-d} + \sum_{e=1}^{j} \gamma_{55} \Delta Unempl_{t-e} + \sum_{g=1}^{k} \gamma_{66} \Delta Youth_{t-g} + \gamma_{02} Dummy_t + \pi_5 ECM_{t-1} + \mu_{5t} \quad (13)$$

$$\Delta\, Youth_t = \varphi_{01} + \sum_{a=1}^{f} \varphi_{11} \Delta lnCrime_{t-a} + \sum_{b=1}^{g} \varphi_{22} \Delta Ref_{t-b} + \sum_{c=1}^{h} \varphi_{33} \Delta Divor_{t-c} + \sum_{d=1}^{i} \varphi_{44} \Delta Educ_{t-d} + \sum_{e=1}^{j} \varphi_{55} \Delta Unempl_{t-e} + \sum_{g=1}^{k} \varphi_{66} \Delta Youth_{t-g} + \varphi_{02} Dummy_t + \pi_6 ECM_{t-1} + \mu_{6t} \quad (14)$$

Where Δ indicates first difference and ECM_{t-1} is the lagged error correction term. The coefficient of the error correction term estimates the speed at which dependent variable returns to equilibrium after a change in independent variables.

4. Empirical Results

According to table 1, Zivot and Andrews unit root test suggests that unemployment rate and LnVioCrime are integrated of order 1, while the rest of the variables are integrated of order 0. The different order of integration justifies the appropriateness of ARDL model. Moreover, the ZA test for LnCrime identified 1991 as the year of structural break.

Table 1: Results of ZA Test

	ZA Test Statistics	
	Level	**1st difference**
LnCrime	-7.211***	-5.186**
LnVioCrime	-3.911	-4.970*
Ref	-7.797***	-6.868***
Divor	-21.758***	-23.092***
Educ	-4.877*	-9.489***
Unempl	-3.680	-5.088**
Youth	-25.056***	-10.125***

Note: ZA critical values are -5.57, -5.08, -4.82 at 1%, 5% and 10% levels; *,** and *** denote significance at 1%, 5% and 10% levels respectively.

The upper bound (*lower bound*) ARDL critical values for restricted intercept and no trend model are 5.256*(3.657),* 3.920*(2.734)* and 3.353*(2.306)* at 1%, 5% and 10% respectively (Narayan, 2005). If ARDL F-statistic is lower than the lower bound, we fail to reject the null hypothesis of no cointegration. If F-statistic is greater than the upper bound, the null hypothesis is rejected. According to table 2, the bound test F-statistic for the models including LnCrime, Ref, Divor, Educ and Youth as dependent variables is statistically significant at 1% level. The analogous results are observed for LnVioCrime. This indicates the presence of cointegration and long run relationship between the variables.

Table 2: Results ofARDL Bound Tests for LnCrime

Model	A	B	C	D	E	F
Optimal Lags	(3,4,4,4,4,4)	(4,1,4,2,2,4)	(4,3,4,4,4,4)	(4,3,2,2,1,0)	(4,1,4,4,4,4)	(4,4,4,4,2,3)
F-Stat (ARDL)	13.142***	12.608***	35.225***	16.443***	3.09	18.656***
R^2	0.999	0.855	0.998	0.899	0.983	0.968
Adj-R^2	0.996	0.598	0.989	0.799	0.932	0.872
F-Stat	333.676	3.328	115.805	8.946	19.226	10.077
DW Stat	1.985	2.793	2.321	2.247	2.595	1.947

Note: *, ** and *** denote significance at 1%, 5% and 10% levels.
Model A: $\mathrm{LnCrime_t} = \mathrm{f(Ref_t, Divor_t, Educ_t, Unempl_t, Youth_t)}$,
Model B: $\mathrm{Ref_t} = \mathrm{f(LnCrime_t,\ Divor_t,\ Educ_t, Unempl_t,\ Youth_t)}$,
Model C: $\mathrm{Divor_t} = \mathrm{f(LnCrime_t, Ref_t, Educ_t, Unempl_t,\ Youth_t)}$,
Model D: $\mathrm{Educ_t} = \mathrm{f(LnCrime_t, Ref_t, Divor_t,\ Unempl_t,\ Youth_t)}$,
Model E: $\mathrm{Unempl_t} = \mathrm{f(LnCrime_t, Ref_t, Divor_t,\ Educ_t,\ Youth_t)}$,
Model F: $\mathrm{Youth_t} = \mathrm{f(LnCrime_t,\ Ref_t, Divor_t, Educ_t, Unempl_t)}$

Table 3: ARDL Bound Tests for LnVioCrime

Model	**A**	**B**	**C**	**D**	**E**	**F**
Optimal Lags	(2,0,2,1,3,0)	(5,4,2,3,4,4)	(3,0,0,3,3,3)	(1,1,0,0,3,0)	(2,2,0,0,0,0)	(1,1,3,0,0,1)
F-Stat (ARDL)	7.716***	5.911***	14.829***	9.072***	1.349	15.056***
R^2	0.996	0.927	0.815	0.757	0.945	0.654
Adj-R^2	0.993	0.636	0.640	0.654	0.924	0.495
F-Stat	404.765	3.183	4.660	7.355	46.267	4.100
DW Stat	1.907	2.505	1.385	1.904	1.895	2.144

Note: *, ** and *** denote significance at 1%, 5% and 10% levels respectively.

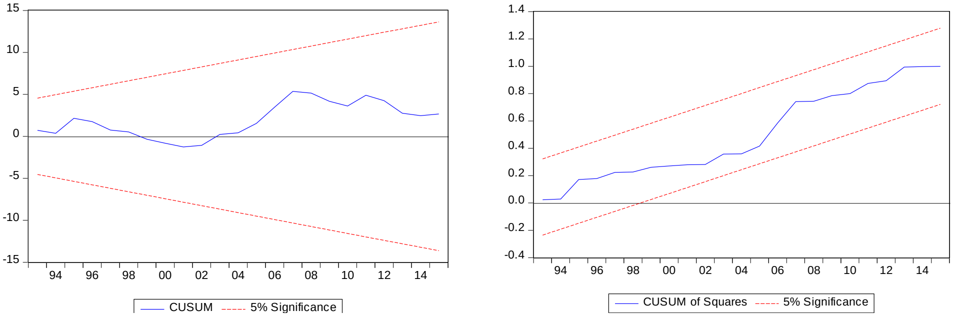
According to the long run results presented in table 4, a 1% increase in the growth rate of refugees will increase the growth rate of total crime by approximately 2.6%. This can be explained by the challenging process of integration which takes significant amount of time and may not be successful which, in turn, can motivate refugees to commit crime in the long run. However no such conclusion can be made for violent crime.

Table 4: Long Run Results

	Model 1: LnCrime			Model 2: LnViolent Crime		
Variable	**Coeff.**	**Std. Error**	**t-stat**	**Coeff.**	**Std. Error**	**t-stat**
Constant	4.562**	1.828	2.496	2.880***	0.550	5.241
$LnCrime_{t-1}$	0.434*	0.210	2.068	…	…	…
$LnVioCrime_{t-1}$	…	…	…	0.927***	0.175	5.306
Ref	0.026***	0.007	3.727	0.010	0.010	0.986
Divor	0.335**	0.134	2.490	0.043**	0.018	2.346
Educ	-0.204	0.209	-0.976	-0.341	0.264	-1.291
Unempl	-0.008	0.007	-1.116	0.0003	0.009	0.030
Youth	0.677***	0.129	5.262	0.471***	0.159	2.971
Dummy	0.230***	0.042	5.493	0.152***	0.031	4.884
R^2	0.979			0.976		
Adjusted-R^2	0.976			0.973		
SE	0.012			0.026		
F-statistic (p-value)	333.676 (0.000)			404.765 (0.000)		
Durbin_Watson	1.985			1.907		
Cusum	Stable$^{\times}$			Stable$^{\times}$		
$Cusum_{sq}$	Stable$^{\times}$			Stable$^{\times}$		

Note: *, ** and *** denote significance at 1%, 5% and 10% levels respectively.

Figure 1: CUSUM and $CUSUM_{sq}$ (ARDL model1) $^{\times}$



According to the short run results in table 5, the effect of growth rate of refugees is positive, but statistically insignificant in both models. This can be explained by cultural shock and fear of deportation, which prevent refugees from committing crime in the short run. The pairwise Granger causality test is used to detect causality relationship between the variables (Engle and Granger, 1987).

Table 5: Short Run Results

	Model 1–LnCrime			Model 2 – LnViolent Crime		
Variable	**Coeff.**	**Std. Error**	**t-stat**	**Coeff.**	**Std. Error**	**t-stat**
Constant	-0.011	0.017	-0.671	-0.046***	0.016	-2.911
Ref	0.030	0.038	0.787	0.038	0.048	0.802
Divor	0.700***	0.073	9.534	-0.465***	0.094	-4.936
Educ	2.263***	0.533	4.249	-1.287	0.887	-1.452
Unempl	0.011	0.010	1.150	-0.039***	0.013	-3.015
Youth	0.165***	0.388	0.426	-2.768***	0.725	-3.819
Dummy	0.029	0.024	1.209	0.094***	0.026	3.637
Error correction term	-0.103*	0.055	-1.867	-0.169***	0.039	-4.296
R^2	0.664			0.723		
Adjusted-R^2	0.459			0.646		
SE	0.035			0.030		
F-statistic (p-value)	3.240 (0.018)			9.451 (0.000)		

Note: *, ** and *** denote significance at 1%, 5% and 10% levels respectively.

Table 6 shows that growth rate of refugees does not Granger cause growth rate of crime. However, significant unidirectional causalities between youth and crime, crime and unemployment, education and crime, unemployment and education are identified.

Table 6: Granger Causality Test

Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**
REF does_not Granger-Cause DIVOR	39	0.113	0.894
DIVOR does_notGranger-Cause REF		0.099	0.906
YOUTH does_notGranger-Cause DIVOR	39	1.063	0.357
DIVOR does_notGranger-Cause YOUTH		0.042	0.959
LNCRIME does_notGranger-Cause DIVOR	39	0.593	0.559
DIVOR does_not Granger Cause LNCRIME		0.263	0.770
UNEMPL does_notGranger-Cause DIVOR	39	1.333	0.277
DIVOR does_notGranger-Cause UNEMPL		2.579	0.091*
EDUC does_not Granger-Cause DIVOR	39	0.201	0.819
DIVOR does_not Granger-Cause EDUC		0.694	0.507
YOUTH does_not Granger-Cause REF	39	0.015	0.986
REF does_not Granger-Cause YOUTH		0.642	0.532
LNCRIME does_not Granger-Cause REF	39	1.091	0.347
REF does_not Granger-Cause LNCRIME		0.300	0.743
UNEMPL does_not Granger-Cause REF	39	0.116	0.891
REF does_not Granger-Cause UNEMPL		0.220	0.804
EDUC does_not Granger-Cause REF	39	0.936	0.402
REF does_not Granger-Cause EDUC		0.005	0.996
LNCRIME does_not Granger-Cause YOUTH	39	2.606	0.089*

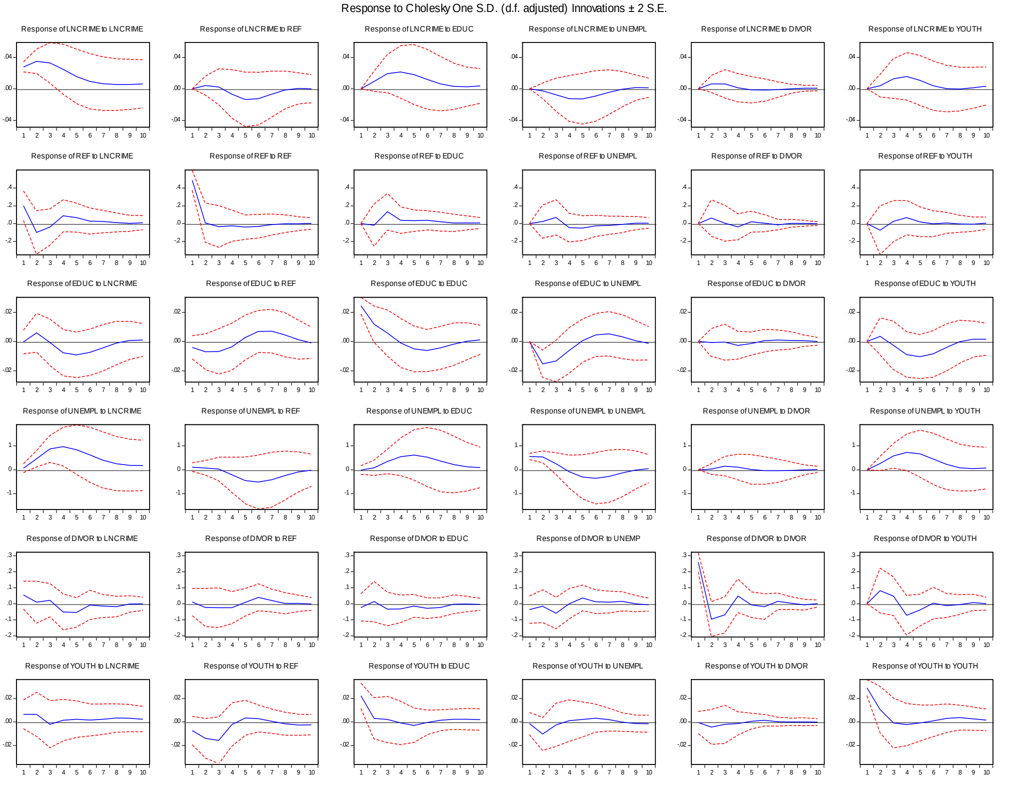
Table 6 continued

YOUTH does_not Granger-Cause LNCRIME		8.896	0.001***
UNEMPL does_not Granger-Cause YOUTH	39	0.750	0.480
YOUTH does_not Granger-Cause UNEMPL		0.308	0.737
EDUC does_not Granger-Cause YOUTH	39	0.238	0.789
YOUTH does_not Granger-Cause EDUC		0.397	0.676
UNEMPL does_not Granger-Cause LNCRIME	39	3.009	0.063*
LNCRIME does_not Granger-Cause UNEMPL		7.719	0.002***
EDUC does_not Granger-Cause LNCRIME	39	3.754	0.034**
LNCRIME does_not Granger-Cause EDUC		2.034	0.147
EDUC does_not Granger-Cause UNEMPL	39	1.376	0.266
UNEMPL does_not Granger-Cause EDUC		6.141	0.005***

Note: *, ** and *** denote significance at 10%, 5% and 1% levels respectively

Impulse response functions (IRFs) were obtained to analyze the dynamic relationship. As in figure 2, the IRFs support the results obtained from long run and short run models.

Figure 2: IRFs



5. Conclusion and Policy Implications

Results indicate that the growth rate of refugees has a positive and statistically significant effect on the growth rate of total crime in the long run, however no such conclusion can be made for the growth rate of violent crime. In addition, the effect of refugees on both crimes becomes insignificant in the short run. Based on our findings two conclusions can be made. First, the fact that positive effect of refugees on total crime becomes statistically significant in the long run indicates that the likelihood of criminal behavior among refugees increases with time. Consequently, the current integration policies in Germany should take into account longer time horizon when integrating refugees into new environment. Second, the effect of refugees on violent crime is insignificant in both long run and short run. Therefore, although it has been identified that the exposure to violence can trigger criminal behavior for the majority of refugees, we cannot say that all refugees as a group represent an immediate threat to society.

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