# Can Migration Fear and Policy Uncertainty Be the Source of Macroeconomic Fluctuations?

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CroEconSur
Vol. 26
No. 1
June 2024
pp. 5-36

Received: February 27, 2024
Accepted: April 25, 2024
Research Article

doi:10.15179/ces.26.1.1



## Abstract

There is no doubt that migration is a complex phenomenon with varied economic, political, and cultural impacts on both the countries of origin as well as the countries of destination. In particular, migration fears and policy uncertainties may have positive or negative consequences on economic activities such as the labor market, price stability, and economic activity in economies either directly or indirectly. For this reason, this study analyzes the causality effect of migration fear and policy uncertainty indices on macroeconomic variables in the most immigrant-receiving countries, the US, the UK, France, and Germany, using both panel and time-varying causality tests. In the study, no causality relationship was found from migration fear and policy uncertainty indices to macroeconomic variables in panel data. However, country-specific time-varying causality relationships

were detected in the time series dimension. According to the findings, it can be stated that policymakers and researchers should consider migration fear and policy uncertainty when determining policies to ensure macroeconomic stability in these countries.

**Keywords:** migration fear index, migration policy uncertainty index, panel data, time-varying causality

**JEL classification:** C22, C23, F22

# 1 Introduction

Throughout history, individuals and groups have migrated from one country to another for economic, political, and social reasons. The concept of migration is currently evaluated in two different ways in sending and receiving countries, leading to different outcomes. Despite the economic difficulties faced by sending countries caused by the loss of skilled labor (Fauser, 2006), migrants are generally viewed negatively by host nations, who perceive migrants as potential problems (Paxton & Mughan, 2006; Stalker, 2002; Robinson, 2013; Roy, 2023). On the other hand, there are opposing views that argue that controlling migration is also important for the sovereignty of the receiving country (Fauser, 2006) as well as that implementing neoliberal policies and not intervening economically will result in economic growth (Misra, Woodring, & Merz, 2006; Roy, 2023). Additionally, the replacement migration theory suggests that low population growth rates increase the need for migration (Hayes & Dudek, 2020). At present, governments are trying on the one hand to encourage migration from other countries to meet labor needs, and on the other hand, to reduce migration trends in order to prevent social issues (Stalker, 2002). Consequently, migration policies are subject to uncertainty depending on the economic situation of countries.

Labor market impacts are one of the most frequently discussed aspects of international migration. The general consensus is that migrants tend to accept lower wages than the country of destination standards. Because of the lower standard of living in their countries of origin, migrants work for lower wages. In the long run, low wages for migrants may pose a problem for workers in the country of destination. As a result, employers may prefer to hire workers at lower costs, while workers earning standard wages may be at risk of becoming unemployed (Fauser, 2006; d'Albis, Boubtane, & Coulibaly, 2016; Valverde & Latorre, 2018). Alternatively, the unwillingness of local workers to perform heavy tasks may lead to migrants' employment in these positions (Hess & Green, 2016). Migrants may also be preferred for unskilled jobs. Another significant problem related to migration is that as skilled labor migrates, the demand for unskilled labor increases to fill the gaps created by these workers (Burkert, Niebuhr, & Wapler, 2008).

Another issue related to migration and migrants is that they have problems with adaptation to the countries to which they have migrated. 9/11 in the United States and the London subway attacks have contributed to negative public perceptions of immigrants (Fauser, 2006). This prejudice may also be influenced by the negative perception created by the news in the media. According to Robinson (2013), in newspaper articles relating to migrants between 2010 and 2012, words such as "illegal" and "failed" were frequently used, which may negatively affect public opinion. As a result of these and other examples, public opinion against migrants is on the rise.

While uncontrolled migration negatively impacts countries in a variety of ways, economic factors are the most fundamental issue (Stalker, 2002). One of the most prominent examples of this idea is the uncontrolled migration caused by colonial activities in the past, particularly in Europe, which led to the emergence of various problems in the future and the recognition of certain rights for migrants. Another factor affecting countries' migration policy is wars and the desire to meet the demand for a reduced labor force as a result of wars. An effective way to meet this

need is through friendly relations between countries (Haddad & Balz, 2006; Misra et al., 2006; Aybek, 2012). The immigration policies of countries change according to their past and present governance. The political parties in power in France have tended to prevent or make it more difficult for non-EU migrants to enter the country since the 1980s (Guiraudon, 2008). In Germany, the Aliens Act, which emerged in 1990, aimed to establish a legal regime that provides greater clarity on immigration issues and greater security for immigrants (Aybek, 2012). Germany maintains this attitude to the present (Hayes & Dudek, 2020; Hess & Green, 2016). Furthermore, the United Kingdom is one of the countries that receives a large amount of immigration. Despite the trend of immigration accelerating from the 1990s to the 2010s (Robinson, 2013), the Brexit referendum in June 2016 indicates a negative perception of immigration on the part of the public (Bennett, 2018; Valverde & Latorre, 2018). From the past to the present, the United States has faced various risks associated with migration movements. Currently, the most pressing problem facing the US with respect to migration flows is the border with Mexico and the illegal migration, drug trafficking, and terrorism that occur across this border (Hiemstra, 2019; Ackleson, 2005). Furthermore, it is a fact that population growth rates in the US, the UK, and the EU have declined recently. To maintain or improve their current economic status, these countries require a young population (Stalker, 2002; Hayes & Dudek, 2020).

Based on all of this information, it can be concluded that immigration has both positive and negative aspects. A large number of migrants would be a burden on the economy, but fewer than a certain number would result in a labor shortage. Therefore, migration can be considered as a constrained optimization problem for which governments should find an optimal solution. This study is based on the migration fear index (MFI) and migration policy uncertainty index (MPUI) developed by Baker, Bloom, and Davis (2016)[1]. They defined the MFI as based

1 In constructing the migration fear and policy uncertainty indices, the term sets are defined as follows:
Migration (M): "border control", Schengen, "open borders", migrant, migration, asylum, refugee, immigrant, immigration, assimilation, "human trafficking"
Fear (F): anxiety, panic, bomb, fear, crime, terror, worry, concern, violent
Economy (E): economic, economy
Policy (P): regulation, deficit, "white house", legislation, congress, "federal reserve"
Uncertainty (U): uncertainty, uncertain.

on the number of newspaper articles containing items M and F, whereas the MPUI is calculated based on the number of newspaper articles containing items M, E, P, and U. Due to the fact that these indices were calculated only for France, Germany, the United Kingdom, and the United States, our study is limited to these countries. Based on the assumption that these indices serve as indicators of migrant perceptions and immigration policies in countries, this study examines causal relationships between these indices and macroeconomic indicators such as unemployment rates, growth rates, and the consumer price index.

Our study contributes to the literature in several ways. First of all, although the number of studies on migration has increased recently, studies on the interaction of migration fear and policy uncertainty with macroeconomic variables are very limited as far as we can see. In this sense, migration fear and policy uncertainty indices have a country-specific and time-dependent effect on macroeconomic variables, especially in the US, the UK, France and Germany, which receive the highest number of migrants. Therefore, this study takes into account the effects of migration fear and policy uncertainty not only on unemployment but also on inflation and growth variables. Secondly, since these developed countries have similar immigration policies as well as country-specific immigration policy approaches, their interaction with macroeconomic variables in both panel dimension and country-specific time dimension is taken into account. Third, to the extent that data on migration fear and policy uncertainty are available, this study includes the latest data by taking into account economic factors such as the recent migrant crisis in Europe and Brexit, as well as the global financial crisis and pandemic. Finally, the study provides the opportunity to compare the causality relations between the migration fear and policy uncertainty indices and macroeconomic variables by using both a fixed method over the sample period developed by Emirmahmutoglu and Köse (2011) and a new method developed by Shi, Philips, and Hurn (2018) and Shi, Hurn, and Phillips (2020) that considers changes and dynamics over time. In fact, the results show that while the panel data method failed to detect causal relationships over the sample period,

the model that takes into account change over time detected causal relationships between variables.

The study is structured as follows: Section 2 contains a literature review of related studies, while Section 3 provides information on the data used in the study and explains both panel and time-varying causality methods to examine the causality relationships between migration fear and policy uncertainty indices and key macroeconomic variables. Section 4 presents and discusses our empirical findings, and Section 5 concludes the paper.

## 2 Literature Review

Although there are studies on the MFI and MPUI from various perspectives, this literature is limited. These studies focus on France, Germany, the United Kingdom, and the United States because the relevant indices are calculated only for these countries. Previous studies have examined only the MFI (Alola, Uzuner, & Akadiri, 2021; Uzuner, Akadiri, & Alola, 2020; Guenichi, Chouaibi, & Khalfaoui, 2022; Roy, 2023; Czudaj, 2018; Bai, Kerr, Wan, & Yorulmaz, 2023) or the MPUI (Ordu-Akkaya, 2018) or both indices together (Donadelli, Gerotto, Lucchetta, & Arzu, 2020; Fraser & Ungor, 2019; Shi, An, Nie, & Yan, 2018) and their relationship with various macroeconomic factors. In studies involving causal relationships, LA-VAR and the causality analysis developed by Emirmahmutoglu and Köse (2011) are preferred. Parallel to the literature, the methods mentioned above were used in this study. A few alternative methods are also employed, including the GARCH model (Guenichi et al., 2022; Ordu-Akkaya, 2018), the VAR model (Fraser & Ungor, 2019; Donadelli et al., 2020), and linear regression (Roy, 2023; Shi, An, Nie, & Yan, 2018; Czudaj, 2018).

Tourism is one of the factors that have been investigated in relation to fear of migration. The preference of tourists for certain destinations may be influenced by security concerns. Therefore, negative news in the media can have an impact on the preferences of tourists. Studies conducted in countries where the MFI

is defined have found that there is a causal relationship from this index to tourism (Alola et al., 2021; Uzuner et al., 2020). These studies also assess the macroeconomic impact of the index.

Whether migration fear has a contagion effect is also one of the issues that have been studied. Studies have empirically proved the existence of this effect, especially during the European migrant crisis, when the civil war in Syria played a significant role (Guenichi et al., 2022; Ordu-Akkaya, 2018). Economic and political developments in one country can have an impact on another due to the effects of globalization and the structure of the European Union. It is reasonable to assume that there is a contagion effect in this regard.

The impact of migration fear and migration policy uncertainty on financial markets is also a topic of interest. The assessment of the countries in which investors intend to invest influences their investment decisions (Roy, 2023). In addition, these indices have been found to affect the volatility of the financial markets (Czudaj, 2018; Ordu-Akkaya, 2018).

Due to the internal dynamics of each country, the effects of the relevant indices on macroeconomic factors also differ in this respect, as mentioned in the previous section. These effects may vary depending on countries' specific attitudes towards migration, social and labor market conditions, and the way migration sensitivity is measured (Donadelli et al., 2020). Using a VAR model, Fraser and Ungor (2019) have found that MPUI and MFI are associated with declines in industrial output in all countries except Germany. Ordu-Akkaya (2018) argues that volatility in the UK and US stock markets is transmitted from the migration index. France and Germany, however, do not show similar results. Taking these examples into account, it can be concluded that the economic/political and demographic consequences of each migration wave depend on the internal dynamic characteristics of each country.

An analysis of the relevant studies in the literature shows that the effects of migration fear and policy uncertainty in the socio-cultural sphere are mostly

taken into account, while the economic effects are examined indirectly. Although there are few studies that directly analyze macroeconomic variables and migration fear and policy uncertainty, it can be seen that the relationship is particularly focused on the unemployment variable. The results obtained in our study support the previous findings, but unlike other studies, country-specific and time-varying causality effects of migration fear and policy uncertainty on macroeconomic variables such as growth and inflation rate have been identified in addition to the unemployment variable. In future studies, migration fear and policy uncertainty should be taken into account when determining the factors affecting macroeconomic variables in developed countries. In this context, our study is expected to contribute to the literature.

# 3 Data and Methods

## 3.1 Data

This study examines the causal relationships between migration fear indices (MFI), migration policy uncertainty indices (MPUI)[2], and macroeconomic variables, including unemployment rate (UR), real growth rate (GR), percentage change from the previous quarter and adjusted for seasonal influences, and consumer price index (CPI)[3], in the United Kingdom, the United States, France, and Germany. In determining the macroeconomic variables used in the study, unemployment rate and consumer price index are the most important factors affecting the migration moves for both home and host countries (Ahmad, Hussain, Sial, Hussain, & Akram, 2008; Baas & Brücker, 2012). At the same time, inflation data is an important variable in terms of the effectiveness of monetary policies in the period under consideration. On the other hand, from the related literature we can state that migration flows are higher to destinations with stronger expected GDP growth, and from origins with weaker expected GDP growth (Lewis & Swannell, 2018). We first examine the causal relationship between the MFI and MPUI

2 Data were obtained from https://www.policyuncertainty.com/immigration_fear.html

3 Macroeconomic data were obtained from the OECD database (OECD, 2023a, 2023b, 2024).

indices and macroeconomic variables using quarterly data and traditional causality methods introduced by Emirmahmutoglu and Köse (2011). In addition to the country-specific causality analysis, we also use a balanced panel causality analysis to account for the contagion effect of migration uncertainty and fear across countries (Guenichi et al., 2022). The second step is to apply the time-varying Granger causality test developed by Shi, Philips, and Hurn (2018) and Shi et al. (2020) to compare the findings and verify their robustness. Also, we use this test because it accounts for the fact that the causal relationship between two variables is likely to change over time as a result of structural breaks (Tang, 2008).

Since the time-varying Granger causality test is performed independently for each country, the sample size is not fixed. The sample period for the UK and the US covers the first quarter of 1990 to the fourth quarter of 2022, the sample period for France covers the first quarter of 1990 to the fourth quarter of 2019, and the sample period for Germany covers the first quarter of 1991 to the fourth quarter of 2022. In order to conduct a balanced panel causality analysis, we limit the sample period to the first quarter of 1991 to the fourth quarter of 2019. All variables, except the unemployment rate and the growth rate, have been logarithmically transformed.

## 3.2 Methods

The purpose of this study is to test whether there is a time-varying Granger causality effect between migration fear and policy uncertainty and macroeconomic variables in the UK, the US, France, and Germany. The causality test involves applying both a country-specific causality test, which does not consider the change over time, and a causality test that considers all countries included in the sample. We use the bootstrap panel causality analysis developed by Emirmahmutoglu and Köse (2011) that takes into account cross-sectional dependence. In this test, no pre-test for cointegration is required, other than the identification of lags. Variables can be used at their level without taking differences.

Traditional Granger (1969) causality tests use stationary variables. In particular, time series such as growth rates, inflation, and unemployment rates often become stationary by taking differences. Therefore, Toda and Yamamoto (1995) developed the lag-augmented vector autoregressive (LA-VAR) method, which prevents data loss and allows the analysis of the data as they were originally collected:

$$y_t = \alpha_0 + \alpha_1 t + \sum_{l=1}^{k} \beta_l y_{t-1} + \sum_{m=k+1}^{k+d} \beta_m y_{t-m} + \varepsilon_t \quad (1)$$

where $t$ is the time trend variable, $k$ is the lag order in VAR, and $\varepsilon_t$ represents the error terms. Additionally, $d$ is an augmentation of the largest possible order of variable integration in the VAR model. Augmented term $\sum_{m=k+1}^{k+d} \beta_m y_{t-m}$ represents possible orders of integration for the endogenous variables in the null hypothesis $H_0 : \beta_1 = \cdots = \beta_k = 0$. With an asymptotic chi-squared distribution with $k$ degrees of freedom, the standard Wald statistic can be used to test the null hypothesis described above.

The causality test of Emirmahmutoglu and Köse (2011) integrates the Granger (1969) causality test procedure with the LA-VAR approach of Toda and Yamamoto (1995). Fisher (1932) test statistic is used to test the Granger causality hypothesis in panel data. The Fisher test statistic ($\lambda$) is defined as follows:

$$\lambda = -2\sum_{i=1}^{N} \ln(\rho_i) \text{ , for } i = 1, \ldots, N \quad (2)$$

where $\rho_i$ is the probability value ($p$-value) for each country determined by the Wald statistic. The limit distribution of the Fisher (1932) test statistic is no longer valid when there is cross-sectional dependence across countries. The limit distribution of the Fisher (1932) test is not chi-squared if the assumption of cross-sectional independence is not met. This problem can be solved by obtaining the bootstrap distribution of the Fisher test statistic (Maddala & Wu, 1999). For panel data models with heterogeneous variables with varying degrees of integration, the VAR model with $k_i + d\ max_i$ lags is as follows:

$$x_{i,t} = \mu_x^i + \sum_{j=1}^{k_i + d_{\max_i}} A_{11,ij}\, x_{i,t-j} + \sum_{j=1}^{k_i + d_{\max_i}} A_{12,ij}\, y_{i,t-j} + u_{i,t}^x \quad (3)$$

$$y_{i,t} = \mu_y^i + \sum_{j=1}^{k_i+d_{\max_i}} A_{21,ij}\, x_{i,t-j} + \sum_{j=1}^{k_i+d_{\max_i}} A_{22,ij}\, y_{i,t-j} + u_{i,t}^y \tag{4}$$

where $d_{\max_i}$ is the maximum degree of integration for each *i* (country). Equations (3) and (4) are estimated without any parameter restrictions, and then the testing procedure of null hypothesis of causality is estimated separately for each country using Wald statistics. Equation (1) is then used to calculate the Fisher test statistic. While (2) tests causality from *x* to *y*, (3) tests causality from *y* to *x*. In the case of cross-sectional dependence, equations (2) and (3) are tested using the bootstrap method.

The time-varying Granger causality test developed by Shi, Philips, and Hurn (2018) and Shi et al. (2020) demonstrates that causal relationships between variables may change over time. In contrast to parametric approaches, the causal relationships between MFI or MPUI and unemployment, growth, and inflation rates are analyzed according to whether the parameters are significant at one point in time or at all points in time. The method is robust to integration and cointegration properties of time series and does not require prior knowledge of the stationarity of time series. The three procedures obtained in this method are based on the LA-VAR approach, which has better dimensional stability than the VAR and VECM methods (Shi et al., 2020).

Applying Toda and Yamamoto's (1995) LA-VAR method to the dynamic effects of MFI and MPUI on selected macroeconomic variables based on $y_t = \left(MF_t^p, MV_t^n\right)$, where $MF_{1t}^p$ is used to denote the aggregate representation of MFI and MPUI dependent variables and $MV_{2t}^p$ is used to denote the aggregate representation of GR, UR, and CPI independent variables, respectively, we obtain the following results:

$$\begin{aligned} MF_{1t}^p = {} & \alpha_{01} + \alpha_{11} t + \sum_{l=1}^{k} \beta_{11,l} MF_{1,t-l}^p + \sum_{l=1}^{k} \beta_{12,l} MV_{2,t-l}^n + \sum_{m=k+1}^{k+d} \beta_{11,m} MF_{1,t-m}^p + \\ & + \sum_{m=k+1}^{k+d} \beta_{12,m} MV_{2,t-m}^n + \varepsilon_{1t} \end{aligned} \tag{5}$$

$$MV_{2t}^{n} = \alpha_{02} + \alpha_{12}t + \sum_{l=1}^{k} \beta_{21,l} MF_{1,t-l}^{p} + \sum_{l=1}^{k} \beta_{22,l} MV_{2,t-l}^{n} + \sum_{m=k+1}^{k+d} \beta_{21,m} MF_{1,t-m}^{p} + \\ + \sum_{m=k+1}^{k+d} \beta_{22,m} MV_{2,t-m}^{n} + \varepsilon_{2t} \tag{6}$$

where $MF_{1t}^{p}$ represents MFI and MPUI for $p$ = 1,2 and $MV_{2t}^{n}$ represents GR, UR, and CPI for $n$ = 1,2,3, respectively, while $t$ denotes the time trend, $k$ represents the lag order in VAR, and $\varepsilon_{1t}$ and $\varepsilon_{2t}$ are the error terms. Furthermore, $d$ is the augmentation of the largest possible order of variable integration in VAR. $\beta_{12,l}$ and $\beta_{21,l}$ are used to examine the causal relationship between MFI, MPUI, and UR, GR, and CPI in the UK, the US, France, and Germany.

Shi et al. (2020) introduced three methods for separating subsamples from the full sample when transforming the VAR model into a time-varying estimator: forward, rolling window, and recursive evolving causality. The forward and rolling window procedures use Wald statistics, while the recursive evolving algorithm uses a subsample of supremum Wald statistics and can be written as follows:

$$SW_{f}\left(f_{0}\right) = \sup_{f_{2}=f,\, f_{1} \in [0,\, f_{2}-f_{1}]} \left\{ W_{f_{1}\, f_{2}} \right\} \tag{7}$$

where $W_{f_1 f_2}$ denotes the Wald statistic based on the sample period from $f_1$ to $f_2$ and $f$ is the fraction of the total sample.

In recursive evolving testing, the temporal stability of Granger-causal relationships is assessed and heteroskedasticity is considered. According to Shi et al. (2020), the recursive procedures are reliable, followed by the rolling window algorithm. However, the power of the forward recursive test is far less than that of the rolling and recursive procedures. Therefore, only the recursive evolving procedure causality results are presented in this study.

# 4 Empirical Results

Augmented Dickey-Fuller (1981) and Phillips-Perron (1988) unit root tests were applied to determine the integration levels of all data used in the study. Table 1 presents the results of the unit root test.

***Table 1:*** *Unit Root Test Results*

| ADF unit root test | | | PP unit root test | | |
|---|---|---|---|---|---|
| | | | **UK** | | |
| ***Variables*** | ***Levels*** | ***1st difference*** | ***Levels*** | ***1st difference*** | ***Outcome*** |
| MPUI | -4.55*** | - | -7.11*** | - | I(0) |
| MFI | -2.75 | -12.74*** | -4.87*** | - | I(1) |
| UR | -2.14 | -5. 96*** | -1.99 | -6.13*** | I(1) |
| GR | -15.34*** | - | -16.37*** | - | I(0) |
| CPI | -1.64 | -2.65* | -4.35*** | - | I(1) |
| | | | **US** | | |
| ***Variables*** | ***Levels*** | ***1st difference*** | ***Levels*** | ***1st difference*** | ***Outcome*** |
| MPUI | -5.65*** | - | -5.85*** | - | I(0) |
| MFI | -4.17*** | - | -7.12*** | - | I(0) |
| UR | -3.11 | -13.20 | -3.02 | -13.32*** | I(1) |
| GR | -13.43*** | - | -13.45*** | - | I(0) |
| CPI | -1.92 | -4.91 | -2.42 | -8.11*** | I(1) |
| | | | **France** | | |
| ***Variables*** | ***Levels*** | ***1st difference*** | ***Levels*** | ***1st difference*** | ***Outcome*** |
| MPUI | -1.72 | -4.13*** | -7.57*** | - | I(1) |
| MFI | -4.87*** | - | -8.60*** | - | I(0) |
| UR | -2.73 | -3.99*** | -1.95 | -6.47*** | I(1) |
| GR | -16.07*** | - | -15.95*** | - | I(0) |
| CPI | -1.40 | -4.27*** | -2.06 | -10.99*** | I(1) |
| | | | **Germany** | | |
| ***Variables*** | ***Levels*** | ***1st difference*** | ***Levels*** | ***1st difference*** | ***Outcome*** |
| MPUI | -2.91 | -6.22*** | -5.28*** | - | I(1) |
| MFI | -3.31* | 10.19*** | -3.25* | -13.88*** | I(1) |
| UR | -2.65 | -4. 09*** | -2.73 | -3.53*** | I(1) |
| GR | -13.96*** | - | -13.97*** | - | I(0) |
| CPI | -1.39 | -7.60*** | -3.45** | -8.21*** | I(1) |

Notes: *, **, and *** denote significance at 10%, 5%, and 1%, respectively. The test allows for a constant and trend. Test critical values are -4.03, -3.44, and -3.14 for 1%, 5%, and 10%, respectively. MacKinnon's (1996) one-sided *p*-values are used. Lag length is based on SIC.

Source: Authors' compilation.

Table 1 shows that MPUI is stationary at the level for the UK and the US, while it is stationary at the first difference for France and Germany. MFI, on the other hand, is stationary at the level for the US and France and integrated of order one for the UK and Germany. UR and CPI are stationary at the first difference in all countries, while GR is stationary at the level for all countries. Accordingly, the results of the unit root tests indicate that the variables considered in the study, although having different levels of integration across countries, become stationary at the first difference. Therefore, the maximum possible order of integration is one ($d = 1$).

To test for cross-sectional dependence in panel data, the Lagrange multiplier (LM) test of Breusch and Pagan (1980), the cross-sectional dependence (CD) test of Pesaran (2004), and the LM test of Pesaran, Ullah, and Yamagata (2008) are applied. Table 2 presents the results of the cross-sectional dependence tests.

***Table 2:*** *Cross-Sectional Dependence Tests*

| | Breusch-Pagan LM | Pesaran bias corrected LM | Pesaran CD |
|---|---|---|---|
| MPUI | 202.22*** (.000) | 56.64*** (.000) | 13.94*** (.000) |
| MFI | 286.78*** (.000) | 81.05*** (.000) | 16.40*** (.000) |
| CPI | 688.52*** (.000) | 197.02*** (.000) | 26.23*** (.000) |
| GR | 172.87*** (.000) | 48.17*** (.000) | 12.72*** (.000) |
| UR | 94.49*** (.000) | 25.54*** (.000) | 6.08*** (.000) |

Notes: The numbers in parentheses are *p*-values. *** $p < .01$, ** $p < .05$, * $p < .10$.
Source: Authors' compilation.

For all variables, the null hypothesis of no cross-sectional dependence is rejected. Therefore, the Fisher test statistic was tested using the bootstrap method. Table 3 presents the results of the country-specific Granger causality tests proposed by Emirmahmutoglu and Köse (2011).

***Table 3:*** *Granger Causality Test Results*

| | MPUI->CPI Wald test | MPUI->GR Wald test | MPUI->UR Wald test | MFI->CPI Wald test | MFI->GR Wald test | MFI->UR Wald test |
|---|---|---|---|---|---|---|
| UK | .47<br>(.78) | 0.08<br>(.76) | 3.61<br>(.16) | .31<br>(.85) | .80<br>(.37) | 1.89<br>(.59) |
| US | 2.31<br>(.50) | .45<br>(.50) | 1.33<br>(.51) | 3.56<br>(.31) | .21<br>(.64) | 3.20<br>(.20) |
| France | 1.13<br>(.28) | 5.70*<br>(.05) | .34<br>(.84) | .01<br>(.98) | .01<br>(.99) | 2.63<br>(.45) |
| Germany | .79<br>(.79) | .11<br>(.73) | .97<br>(.61) | .35<br>(.55) | 1.60<br>(.20) | 7.32**<br>(.02) |
| Panel Fisher test stat. | 6.29<br>(.95) | 8.24<br>(.89) | 6.26<br>(.47) | 3.86<br>(.84) | 6.05<br>(.74) | 13.58<br>(.19) |
| Lags | 2,3,1,1 | 1,1,2,1 | 2,2,2,2 | 2,3,1,1 | 1,1,1,1 | 3,2,3,2 |

Notes: *, **, and *** denote significance at 10%, 5%, and 1%, respectively. The numbers in parentheses are bootstrap *p*-values. Critical values are based on 1,000 bootstrap replications. Lag length is based on SIC.

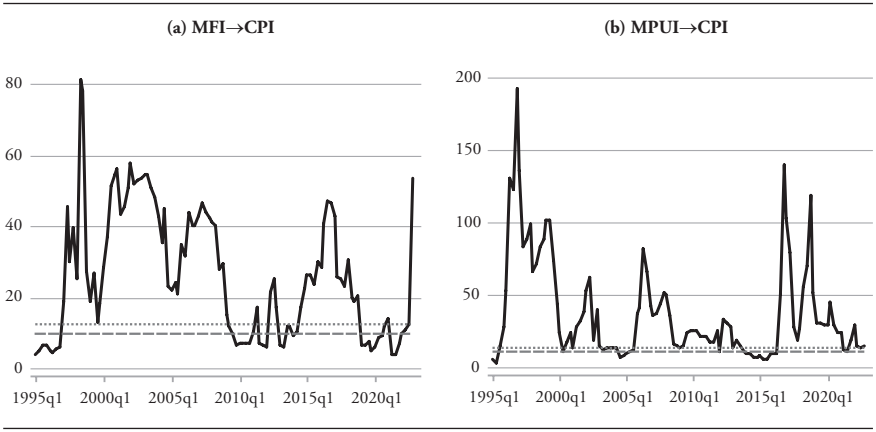
Source: Authors' compilation.

According to Table 3, the null hypothesis that MFI and MPUI are not the Granger cause of CPI, GR, and UR in the panel data including the UK, the US, France, and Germany cannot be rejected according to bootstrap probability values. Hence, when all of these countries are considered, there is no causal relationship between MFI and MPUI and the main macroeconomic variables. However, based on country-specific causality relationships, the null hypothesis that MPUI is not the Granger cause of growth rates is rejected at the 10 percent significance level in France. In addition, the null hypothesis that MFI is not the Granger cause of unemployment rates is rejected at the 5 percent significance level in Germany. Thus, migration policy uncertainty may impact the growth rate in France, while migration fear may affect unemployment rates in Germany.

The causality results obtained do not take into account the change over time and could change over time when structural breaks are considered. To compare the results and assess their robustness, time-varying Granger causality tests, developed by Shi et al. (2020), were applied. Figures 1–3 demonstrate the time-varying unidirectional causality relationship between MFI and MPUI

with macroeconomic variables for the United Kingdom.[4] The results of the time-varying Granger causality test from migration policy uncertainty index to inflation, growth rate, and unemployment rate are presented in the first column, and the results of the time-varying Granger causality test from migration fear index to macro variables are presented in the second column.

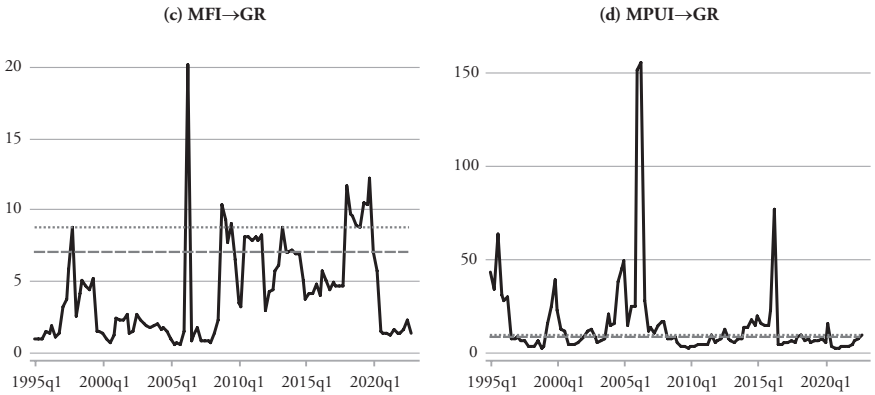
***Figure 1:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting the UK's Inflation Rate*




Source: Authors' compilation.

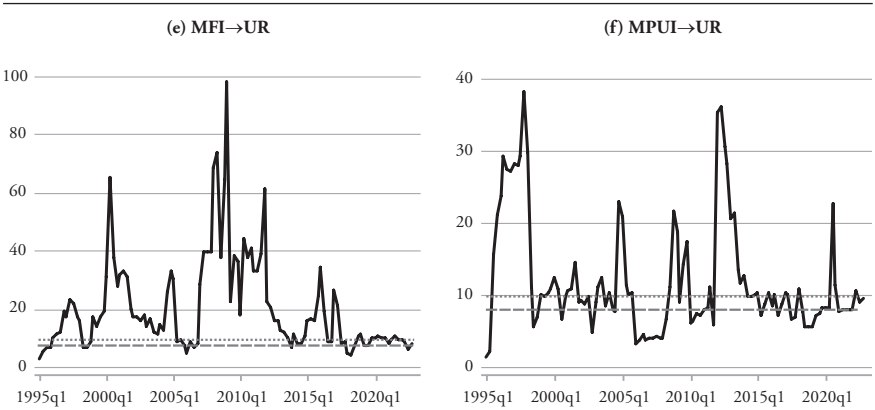
4 Figures 1–3 show the results of the recursive evolving Granger causality test from migration fear and policy uncertainty indices to the UK's inflation, growth, and unemployment rate and panels (a), (b), (c), (d), (e), and (f) show the results of the Wald tests for Granger causality from migration fear and policy uncertainty indices to the UK's inflation, growth, and unemployment rate, respectively. Lag lengths are determined according to the Schwartz Bayesian information criterion (SBIC). The lag lengths in the basic VAR model for the relationships between MPUI and CPI, GR, and UR are identified as 3, 2, and 2, respectively. The lag lengths in the basic VAR model for the relationships between MFI and CPI, GR, and UR are determined as 3, 1, and 3, respectively. The maximum possible order of integration is equal to unity ($d = 1$) and includes trend. The 10 percent and 5 percent bootstrapped critical values (lower and upper horizontal lines, respectively) are based on 1,000 replications. The minimum window size is set at 21 (5 year) observations for MPUI and MFI since 1995 is the base year. Wald statistics are robust to heteroskedasticity.

***Figure 2:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting the UK's Growth Rate*




Source: Authors' compilation.

***Figure 3:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting the UK's Unemployment Rate*




Source: Authors' compilation.

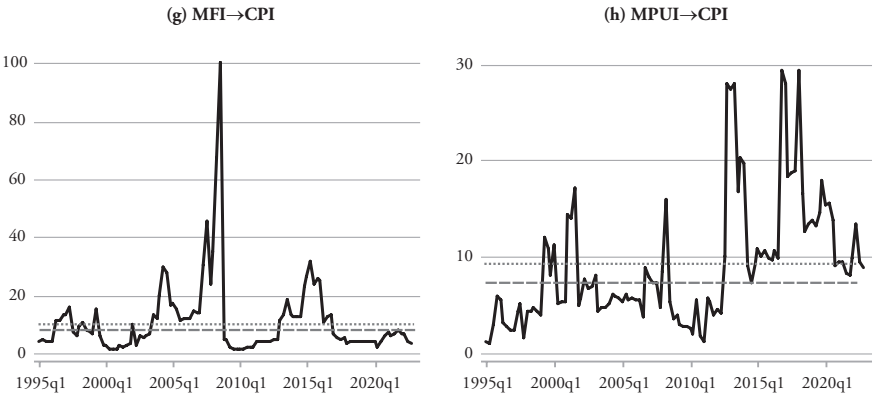
Based on the recursive algorithm, Figure 1 illustrates the time-varying causality relationship between MPUI, MFI, and consumer prices in the United Kingdom.

In the UK economy, MPUI and MFI have generally been the source of inflation over the period considered. In this process, the continued rise in inflation rates following destabilizing effects such as the global financial crisis and the pandemic, as well as the increased volatility in the migration fear and policy uncertainty index, have had an effect. It can be stated that migration fear and policy uncertainty should be considered one of the causes of UK inflation. Using a recursive algorithm, Figure 2 illustrates the time-varying causal relationships between MPUI and MFI on growth rates. Despite the fact that the causal effect of migration policy uncertainty on the growth rate varies over time, it can be argued that migration fear has a greater causal effect. In summary, we can conclude that both migration uncertainty and migration fear are the causes of economic growth between 2005–2008 and 2018–2020. The results of the time-varying causality test of migration fear and policy uncertainty on the unemployment rate in the UK are shown in Figure 3. Both indices cause unemployment, although they fluctuate over time. Consequently, migration fear and policy uncertainty can be considered when analyzing the factors affecting the unemployment rate in the UK economy. Thus, comparing the time-varying causality results in the UK economy with the test results in Table 3, it might be concluded that migration fear and policy uncertainty have time-varying effects on macroeconomic variables.

Figures 4–6 show the time-varying unidirectional causal relationship between MPUI, MFI, and macroeconomic variables in the United States.[5]

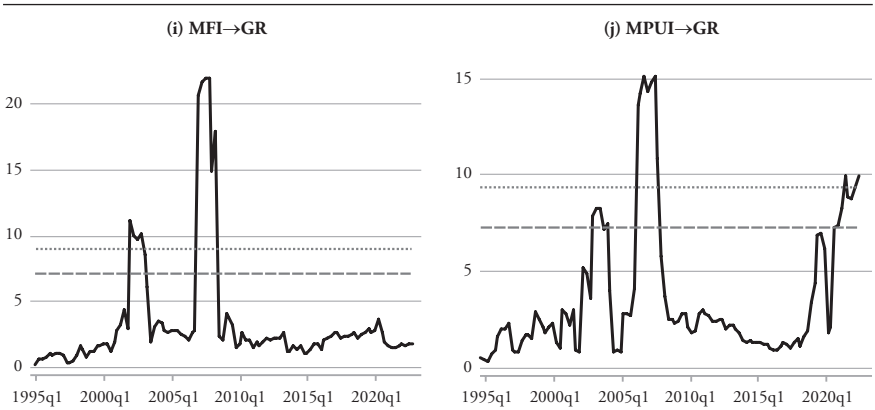
5 Figures 4–6 show the results of the recursive evolving Granger causality test from migration fear and policy uncertainty indices to the US's inflation, growth, and unemployment rate and panels (g), (h), (i), (j), (k), and (l) show the results of the Wald tests for Granger causality from migration fear and policy uncertainty indices to the US's inflation, growth, and unemployment rate, respectively. Lag lengths are determined according to the Schwartz Bayesian information criterion (SBIC). The lag lengths in the basic VAR model for the relationships between MPUI and CPI, GR, and UR are identified as 2, 1, and 1, respectively. The lag lengths in the basic VAR model for the relationships between MFI and CPI, GR, and UR are determined as 2, 1, and 1, respectively. The maximum possible order of integration is equal to unity ($d = 1$) and includes trend. The 10 percent and 5 percent bootstrapped critical values (lower and upper horizontal lines, respectively) are based on 1,000 replications. The minimum window size is set at 21 (5 year) observations for MPUI and MFI since 1995 is the base year. Wald statistics are robust to heteroskedasticity.

***Figure 4:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting the US's Inflation Rate*



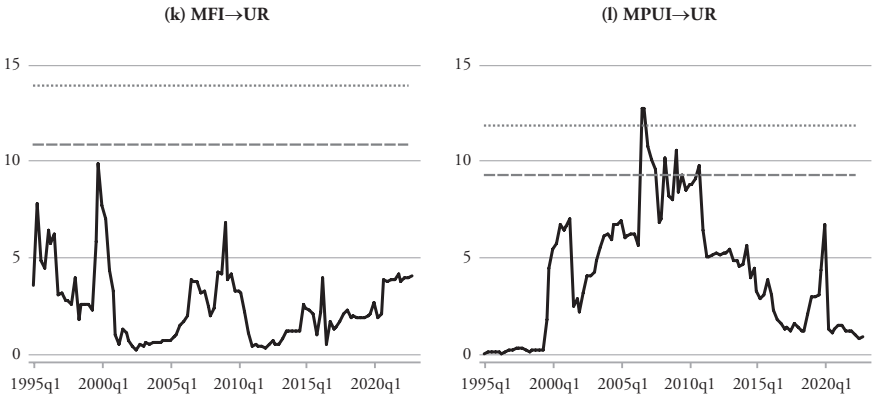

Source: Authors' compilation.

***Figure 5:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting the US's Growth Rate*




Source: Authors' compilation.

***Figure 6:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting the US's Unemployment Rate*

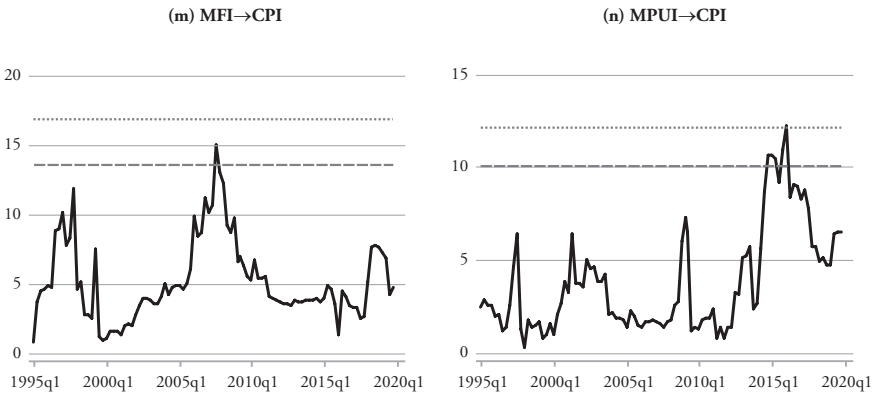



Source: Authors' compilation.

Figure 4 illustrates the time-varying causality results of MPUI and MFI on US consumer prices according to the recursive algorithm. Migration policy uncertainties have contributed to US inflation, especially during the period after the global financial crisis in 2009, but the fear index has had a limited causal effect. For both variables, there is a causal effect on inflation during the 2008 elections and the comprehensive immigration law. In general, migration fears and policy uncertainties do not cause economic growth. However, Figure 5 illustrates that migration fear and policy uncertainty cause economic growth in a similar period. According to Figure 6, MFI has no causal effect on unemployment rates in the US, while MPUI has a limited causal effect prior to the 2008 elections. As a result, when we compare the time-varying causality test results in the US economy with the test results in Table 3, we can conclude that migration policy uncertainty and migration fears have a causal effect on macroeconomic variables in the 2008 election period spanning 2005–2009.

Figures 7–9 show the time-varying unidirectional causal relationship between MPUI, MFI, and macroeconomic variables in France.[6]

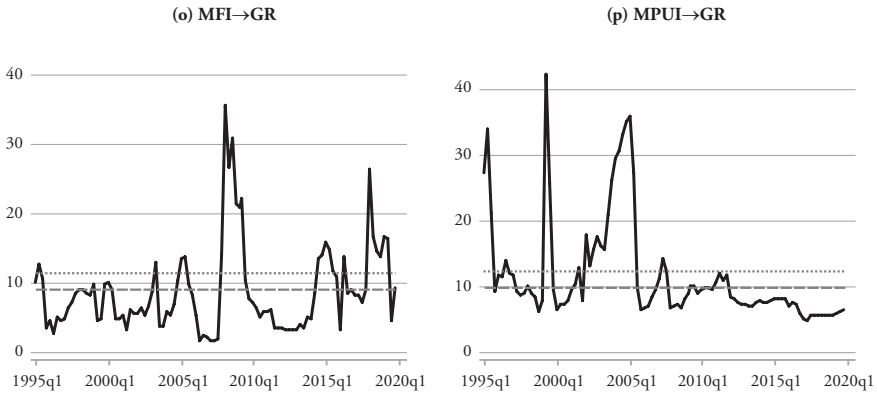
***Figure 7:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting France's Inflation Rate*




Source: Authors' compilation.

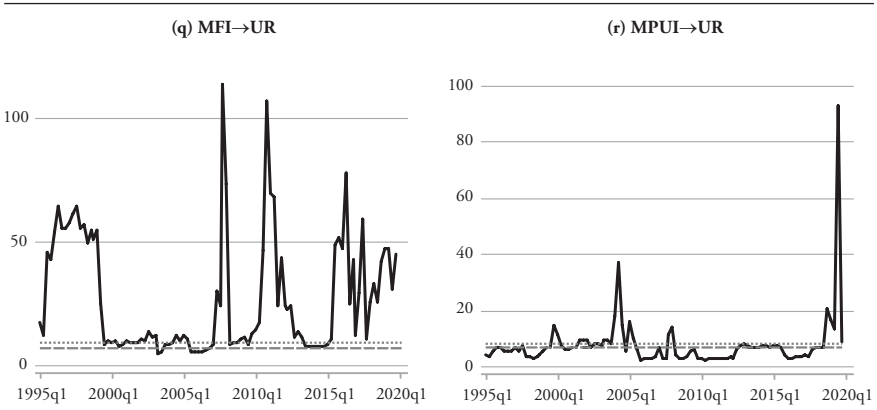
6 Figures 7–9 show the results of the recursive evolving Granger causality test from migration fear and policy uncertainty indices to France's inflation, growth, and unemployment rate and panels (m), (n), (o), (p), (q), and (r) show the results of the Wald tests for Granger causality from migration fear and policy uncertainty indices to France's inflation, growth, and unemployment rate, respectively. Lag lengths are determined according to the Schwartz Bayesian information criterion (SBIC). The lag lengths in the basic VAR model for the relationships between MPUI and CPI, GR, and UR are identified as 1, 2, and 2, respectively. The lag lengths in the basic VAR model for the relationships between MFI and CPI, GR, and UR are determined as 1, 2, and 3, respectively. The maximum possible order of integration is equal to unity ($d = 1$) and includes trend. The 10 percent and 5 percent bootstrapped critical values (lower and upper horizontal lines, respectively) are based on 1,000 replications. The minimum window size is set at 21 (5 year) observations for MPUI and MFI since 1995 is the base year. Wald statistics are robust to heteroskedasticity.

***Figure 8:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting France's Growth Rate*




Source: Authors' compilation.

***Figure 9:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting France's Unemployment Rate*




Source: Authors' compilation.

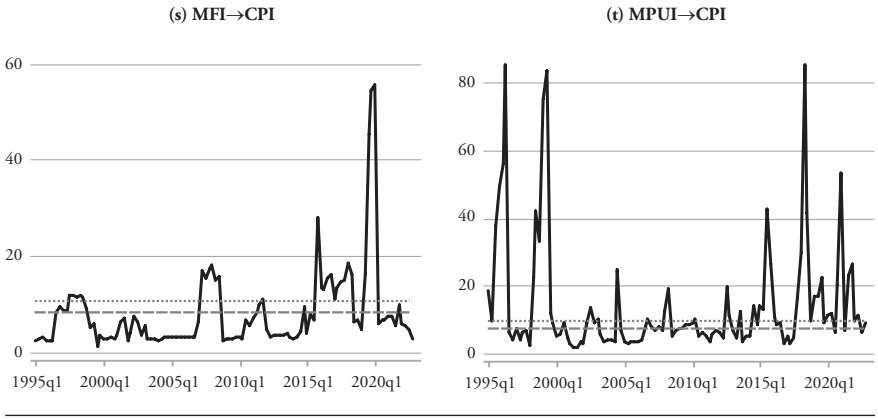
Figure 7 illustrates the time-varying causality test results of MPUI and MFI on consumer prices in France according to the recursive algorithm. According

to the results, both migration fear and policy uncertainty are not the causes of inflation. During the 1995–2006 period, uncertainty in migration policies had periodic causal effects on the growth rate (see Figure 8). Compared to the test results in Table 3, it can be observed that migration policy uncertainties affect growth rates in this period. However, MFI had limited causal effects on the growth rate during this period. The causality effects of MFI on the growth rate in France were found during the adoption of the new immigration and integration law, the 2007 elections, and the European refugee crisis. According to Figure 9, MPUI has a limited causal effect on unemployment rates, whereas MFI has a generally significant causal effect on unemployment rates. There is no causal effect of migration policy uncertainties and migration fears on inflation. However, migration fear has a more significant impact on the growth rate and unemployment than migration policy uncertainty. Accordingly, the variables of migration fear and policy uncertainty should be considered periodically when considering the factors affecting growth rates and unemployment rates in the French economy.

Figures 10–12 show the time-varying unidirectional causal relationship between MPUI, MFI, and macroeconomic variables in Germany.[7]

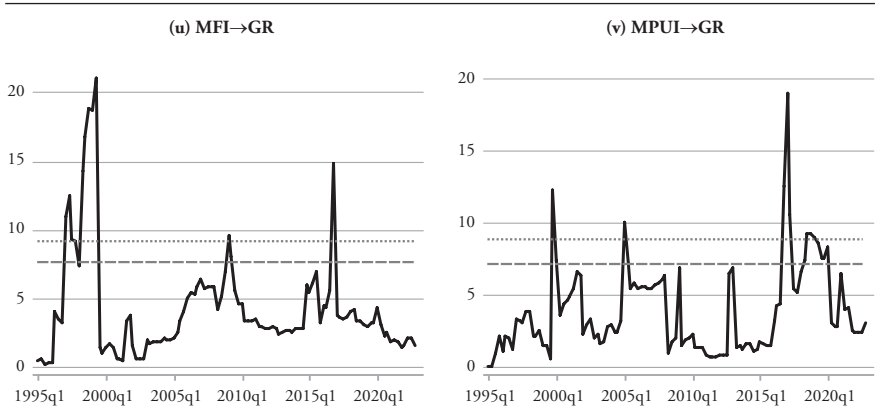
7 Figures 10–12 show the results of the recursive evolving Granger causality test from migration fear and policy uncertainty indices to Germany's inflation, growth, and unemployment rate and panels (s), (t), (u), (v), (w), and (x) show the results of the Wald tests for Granger causality from migration fear and policy uncertainty indices to Germany's inflation, growth, and unemployment rate, respectively. Lag lengths are determined according to the Schwartz Bayesian information criterion (SBIC). The lag lengths in the basic VAR model for the relationships between MPUI and CPI, GR, and UR are identified as 2, 1, and 2, respectively. The lag lengths in the basic VAR model for the relationships between MFI and CPI, GR, and UR are determined as 1, 1, and 2, respectively. The maximum possible order of integration is equal to unity ($d = 1$) and includes trend. The 10 percent and 5 percent bootstrapped critical values (lower and upper horizontal lines, respectively) are based on 1,000 replications. The minimum window size is set at 17 (4 year) observations for MPUI and MFI since 1995 is the base year. Wald statistics are robust to heteroskedasticity.

***Figure 10:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting Germany's Inflation Rate*



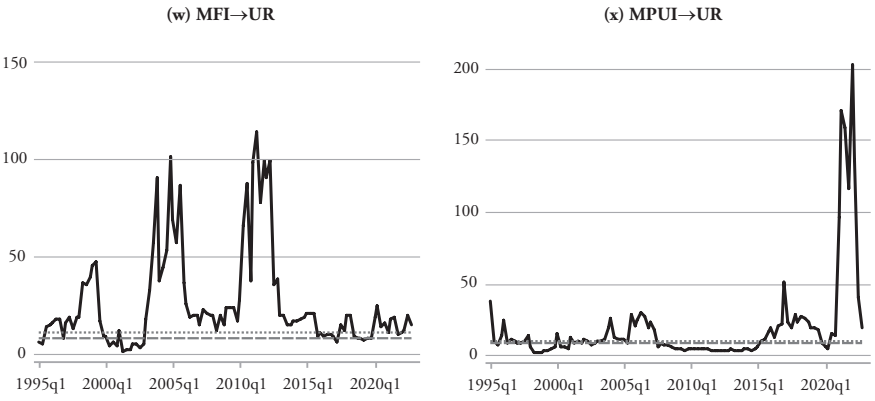

Source: Authors' compilation.

***Figure 11:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting Germany's Growth Rate*




Source: Authors' compilation.

***Figure 12:*** *The Recursive Evolving Test Results of Migration Fear and Policy Uncertainty Indices Affecting Germany's Unemployment Rate*




Source: Authors' compilation.

Figure 10 illustrates the results of the time-varying causality test of MPUI and MFI on consumer prices in Germany according to the recursive algorithm. Considering that migration policy uncertainty in Germany is more volatile than migration fear, it is found that until the European refugee crisis, migration policy uncertainty was partly the cause of inflation, while after the European migration crisis, both migration policy uncertainty and migration fear were the cause of inflation. Figure 11 illustrates a similar but more limited effect on the growth rate. At the same time, a causality effect on the growth rate is observed in this period when migration uncertainty and fear increased due to the change in the citizenship law for children born in Germany. According to Figure 12, while migration fear is a factor affecting unemployment rates in Germany, the causal effect of migration policy uncertainty on unemployment rates is limited. This result supports the Table 3 results. Migration uncertainties and fears have more widespread, albeit temporary, causal effects on macroeconomic variables in the German economy, especially during the European refugee crisis. It is particularly

important to consider migration fear and policy uncertainty when analyzing the factors affecting macroeconomic variables during this period.

## 5 Conclusion and Discussion

Fears and uncertainties related to migration policies are considered to be essential for the macroeconomic stability of countries in this process in which migration and asylum are increasing and expected to further increase, especially in developed economies, due to reasons such as poverty, instability, wars, and terrorism. In this study, we analyze the unidirectional causality between the recent increase in migration fear and policy uncertainty and macroeconomic variables. We examined the causality effect of the migration fear index and migration policy uncertainty index constructed by Baker et al. (2016) for the UK, the US, France, and Germany on macroeconomic variables using both country-specific and panel data. The Granger causality test developed by Emirmahmutoglu and Köse (2011) was used for country-specific and panel data, and the method developed by Shi et al. (2020) was used for country-specific time-varying Granger causality analysis.

According to the results, panel data indicate that migration fears and policy uncertainties are not Granger causes of macroeconomic variables. In the absence of time-varying causality relations specific to countries, it appears that in France, migration policy uncertainty is the cause of growth rates, while in Germany, migration fear is the cause of unemployment rates. Based on time-varying effects, we observe that migration fear and policy uncertainty have a time-varying effect on inflation and unemployment rates in the UK, but a more limited effect on growth rates. In the US economy, migration fear and policy uncertainty have more limited effects than in the UK economy. These effects generally emerged between 2005 and 2009. In spite of the fact that migration fears and policy uncertainties have not been found to be the cause of inflation in the French economy, it has been observed that migration uncertainties affect economic growth, particularly in the 1995–2005 period, while migration fears periodically affect unemployment

and growth rates following the European refugee crisis. In the German economy, it can be stated that migration fear and policy uncertainties have an impact on macroeconomic variables during and after the European refugee crisis; in particular, migration fear has an impact on the unemployment rate.

According to the findings of this study, policymakers in the UK, the US, France, and Germany should develop policies that account for time-varying causality effects in order to maintain stable economic policies in the face of increasing migration fears and policy uncertainties. In addition, researchers should not ignore the uncertainty and fear associated with migration when identifying the factors that affect macroeconomic variables such as inflation, economic growth, and unemployment, and should assess them taking into account changes over time. Similarly, policymakers should take migration fears and policy uncertainties into account when implementing macroeconomic stabilization policies.

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