Drought, Mafia and Slavery:
Empirical Evidence from Nigerian Mafia's Human Trafficking in Italy

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Abstract

I study how Nigerian mafias exploit the vulnerability of people affected by climatic shocks through human trafficking to increase their illicit activities in Italy. Exploiting two empirical strategies, a shift-share IV and a difference-in-differences approach, I find that climatic shocks occurring in Edo State result in an increase in crimes related to human trafficking in Italy. The effect on crimes becomes significant after three quarters and lasts up to three years. Additionally, it is strongly correlated with the density of Nigerian communities in Italian provinces, suggesting that social networks play a key role in driving trafficking-related crimes. My findings indicate that climatic shocks can have nontrivial implications for organized crime.

Keywords: Climate Change, Migration, Crime, Human Trafficking, Mafia, Nigeria

JEL: F22, Q54, O13, O15

1   Introduction

In the coming decades, the effects of climate change will impact a significant portion of the global population (IPCC, 2014). Average rise in temperatures, changes in precipitation patterns, rising sea levels and other climate extremes, such as heatwaves and droughts, will become the norm (Jones & O'Neill, 2016). Climate extremes are expected to have more severe impacts on agricultural production, and indirectly affect low and middle-low income regions where agriculture is among the main sources of employment, livelihood, and income (Barrios et al., 2006; Deschenes & Greenstone, 2007; IPCC, 2014). In this scenario, migration has found to be one of the response mechanisms for populations who need to adapt to these events and their consequences (Black et al., 2013; Castells-Quintana et al., 2018; Cattaneo & Massetti, 2019; Vinke et al., 2020). Previous studies indicate that climatic shocks in regions with weaker, agriculture-based economies may result in *immobility*, a condition in which climatic events trap rural populations in poverty, rendering them unable to afford migration expenses and leading to increasingly severe poverty conditions (Cattaneo et al., 2019; Letta et al., 2023). Drawing from studies that identified this phenomenon in Nigeria (Cattaneo & Massetti, 2019; Flores et al., 2024), I provide empirical evidence on how organized crime groups exploit the inability of people affected by climatic shocks to migrate in order to expand their illicit business operations. Since immobility essentially depends on the level of vulnerability and intensity of shocks, this phenomenon is characterized by significant regional heterogeneity. Indeed, both Italian institutional reports[1] and literature (Allanana, 2013; Carling, 2006; Omilusi, 2019) identify Edo State as the main recruitment area for victims of human trafficking from Nigeria to Italy.

The two main hypotheses I test in this paper are that the occurrence of climatic shock in Edo State increases human trafficking-related activities in Italy, and that the Nigerian social network in regions of destination acts as a pull-factor for illicit activities committed by Nigerian organized crime groups. While the first hypothesis provides a direct evidence of climate-induced crimes, the second aims to evaluate its complex mechanisms of intensity and timing. The data I employ derives from a restricted access dataset provided by the Italian Ministry of the Interior. This data contains the monthly number of crimes related to human trafficking activities committed by Nigerian and foreign citizens at the provincial (NUTS-3) level for the period 2011 - 2022.

My empirical strategy is twofold. First, I follow the approach by Derenoncourt (2022) and Bove et al. (2023), consisting in a shift-share framework where the current presence of Nigerian citizens is instrumented by using Nigerian population in the period preceding the analysis, interacted with a variable capturing the occurrence of a severe drought period in Edo State in April 2017. In addition, to capture dynamic effects, I frame the analysis in event-study difference-in-differences setting that exploits heterogeneous presence of Nigerian population at the province level, and before/after variation in the occurrence of the severe drought.

My baseline estimates show that climate-induced migration positively impacts human trafficking-related crimes. The size of the effect is not negligible: on average, an increase of 1,000 Nigerian citizens correspond to an increase

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[1] Relazione sull'attività svilta e sui risultati conseguiti dalla Direzione Investigativa Antimafia, 2018 (Camera dei Deputati, Doc. LXXIV, n.3);
Attività criminali delle organizzazioni nigeriane, con una prima indagine parlamentare sulla portata della "Green Bible", 2022 (Commissione parlamentare di inchiesta sul fenomeno delle mafie e sulle altre associazioni criminali, anche straniere, Senato della Repubblica, Camera dei Deputati, Doc. XXIII n. 37 Sez. XV); and
La mafia nigeriana in Italia: Focus, 2020 (Dipartimento della Pubblica Sicurezza, Direzione Centrale della Polizia Criminale)

of 40% of human trafficking-related crimes committed by Nigerian citizens over total foreign crimes. Regarding the intensity and timing of trafficking activities, the effect emerges one year after the event and peaks at 23% two years later, persisting for up to three years.

My results contribute to three main strands of literature. First, this paper expand the significant body of work investigating the complex linkages between climate and migration. The related literature distinguishes between sudden- and slow-onset events. The impact of the former, which often manifest with great intensity, tends to cause temporary displacement over short distances (Devkota et al., 2017; Kim & Marcouiller, 2018). The impact of the slow-onset events, however, has yielded conflicting results. While many studies have described and analyzed significant departures in response to these events (Beine & Jeusette, 2021; Black et al., 2013; Di Falco et al., 2024; Miyan, 2015), others have examined a reduction in migration (Cattaneo & Peri, 2016; Chen et al., 2017), demonstrating that for the poorest countries, a slow-onset climate event serves as a barrier to migration. Moreover, although the immobility phenomenon has been empirically demonstrated, also in Nigeria (Cattaneo & Peri, 2016), no studies analyze its potential consequences. In this regard, this paper is the first to provide causal evidence on the mechanism linking climatic shocks to human trafficking-related crimes by considering the activities of organized crime groups in exploiting vulnerable populations. Second, this paper draws from the social network theory in individuals' location decisions in the expansion of mafia-like organizations. In particular, the literature has reached a consensus in establishing that large migration flows have led to the expansion of organized crime groups outside their original territories (Buonanno & Pazzona, 2014; Dalla Chiesa, 2010; Lupo, 2008; Varese, 2006). In this paper, the social network theory in individuals' location decisions, which states that migrants from a country tend to settle in regions where previous migrants from their communities have moved (Carrington et al., 1996; Derenoncourt, 2022; Stuart & Taylor, 2019), is functional to understand the role of social networks in the activities of Nigerian organized crime groups in Italy. Finally, this paper also relates to the literature that investigates the spatial dimension of criminal organizations. This strand of the literature has mainly focused on the impact on gross domestic product growth (Pinotti, 2015a), on foreign direct investments (Daniele & Marani, 2011) and industrial policies (Barone & Narciso, 2015); but also on how they exploited the migration crisis (Luca & Proietti, 2022; Martone, 2018) and climatic shocks (Dube et al., 2016; Tiscornia, 2023) in order to increase their illegal activities. Using provincial-level data, this paper analyzes where climate-related human trafficking activities are predominant in Italy.

The rest of the paper is structured as follows. In Section 2 I describe the phenomenon of human trafficking between Nigeria and Italy, highlighting both the role of activities carried out by the Nigerian Mafias in the federal state of Edo State and the role of social networks in the spread of the illicit activities of the Nigerian Mafias. In Section 3 I describe the data I used and provide a description of human trafficking-related crimes in Italy. In Section 4 I present the empirical strategy of the paper. Section 5 and Section 6 show the main results and the robustness checks, respectively. Finally, in Section 7 I conclude by discussing my findings and potential implications.

2   Human Trafficking from Nigeria to Italy

In comparison to other African nations, Nigeria distinguishes itself primarily through its vast size and remarkable cultural, ethnic, and linguistic diversity. With an approximate population of 213 million people, Nigeria ranks as the

sixth most populous country globally, experiencing a rapid population growth during the last decades. Structured as a Federal Republic, Nigeria comprises 36 States and its history is marked by a rich tapestry of diverse ethnic and religious groups. The most significant religious division in Nigeria is between the northern regions with a Muslim majority, and the southern regions with a Christian majority. In addition there are strong local religious traditions practiced more or less openly by both Christians and Muslims in many parts of the country, which play a fundamental role in the process of human trafficking in Nigeria (Carling, 2006). Nigeria is among the poorest countries in West Africa and one with the greatest social and gender inequalities. Uneven distribution of natural resources, the British colonialism, regionalism, and the 36 States creation are the main causes to the imbalances between North and South, richer and poorer regions, and cores and periphery. These inequalities have caused unemployment, development traps, overpopulation in the more developed region, high level of corruption, and environmental degradation. All these factors, combined with the high level of corruption in Nigeria, have played a crucial role in promoting irregular migration to Europe through the activities of Nigerian organized crime (Carling, 2006). Moreover, the Nigerian society is a patriarchal society that put women in an unequal position in families and marginalize women in education, economy, labor markets, politics, and business (Allanana, 2013). Gender inequality and poor living condition make emigration attractive to many women because it represents one of the few opportunities to achieve economic independence and gain a socially recognized status (Salt & Stein, 1997; Siegel, 2012).

Migration between Nigeria and Europe has attracted considerable attention from governments and the media only in recent years since these migratory flows are linked to both human smuggling and human trafficking. Human smuggling refers to the facilitation of entry into a third country in violation of immigration rules, often in exchange for payment. It is typically the result of an agreement between two parties: a migrant who lacks the opportunity to migrate legally and a smuggler who offers services among which providing forged documents and/or transportation in exchange for payment, without necessarily implying an element of human exploitation(Omilusi, 2019). In contrast, trafficking implies an element of exploitation, and it indicates that individuals are forced, deceived, or threatened into situations where they are exploited sexually, financially, or through forced labor (Carling, 2006; Omilusi, 2019)[2].

The Nigerian organized crime groups, called *cults*, emerged from Nigerian universities as student organizations. Originally, these were cultural associations, primarily founded on social promotion, fight against colonialism, and promotion of pro-independence and pan-Africanist debates. The first of these organizations was the Pyrates Confraternity, founded in 1952 at the University of Ibadan by Professor Wole Soyinka (winner of Nobel Prize in Literature in 1986). The transformation of these *cults* from university associations into complex criminal groups began following the coup that took place in Nigeria in December 1983. Subsequently, the *cults* started moving from campuses to communities, and some of them began acting as local vigilantes. In this way, they started serving as hired guns for politicians, playing a crucial role in the Nigerian underworld and often becoming key actors in the production of order and disorder in the southern part of the country, especially near the Niger Delta. In 1999, with the advent of democracy, internal struggles occurred among the various political parties in Nigeria, which, in order to secure their election victories, also involved the *cults*. Their involvement was both to obtain votes and as an armed wing integrated with the local police. Over time, the *cults* gained strength and power, managing to infiltrate Nigeria's

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[2] see Appendix A.1 for more details

economic, political, and social spheres. In 2001, the Nigerian government introduced the crime of creating and participating in the activities of these organizations with the *Secret Cults and Secret Society Prohibition Bill*. But this did not prevent their spread and proliferation, even abroad, particularly in Europe, North and South America, Japan, and South Africa.

The spread of Nigerian *cults* in Italy occurred mainly by exploiting migration flows. [3] From 2002 to 2023, the number of Nigerian citizens legally residing in Italy has increased significantly: in 2002, there were about 17,000, while in 2023, there were more than 123,000[4]; to which must be added the so-called *'invisibles'* (unregistered irregular migrants). This has made the Nigerian community the third-largest African-origin group in Italy, after Moroccan and Egyptian citizens, as well as the largest Nigerian community in Europe. The highest concentration of Nigerian citizens is in Emilia Romagna, Lombardy, Veneto, and Piedmont, regions that offer more job and economic opportunities. The growth of the Nigerian population, combined with its low employment rate, is considered an extremely significant factor by the DIA (Direzione Investigativa Antimafia – Antimafia Investigation Directorate) since unemployed or inactive individuals may be attracted by criminal groups. In addition to this, another concern for the Italian law enforcement agencies is the progressive increase in the flow of money (mostly remittances) from Italy to Nigeria, many of which are of legal origin, but the presence of money from illegal activities cannot be excluded.[5]

The Nigerian *cults* are organized in a hierarchical manner, with each member having a specific role. Access to the group is controlled by the leadership and involves an initiation ritual, as well as an obligation to financially support the organization. This support includes providing for the families of incarcerated members, following a system of social assistance. This last element is particularly significant in Italian jurisprudence, as it contributes to classifying the criminal group as a mafia-type organization [6]. There are four *cults* officially recognized as Mafia-type organization in Italy, following the definition provided by the Article 416bis of the Penal Code [7], and they are: *Supreme Eiye Confraternity*, *Black Axe Confraternity*, *Maphite*, and *Vikings*. [8].

The main illegal activities carried out by the *cults* in Italy are related to human trafficking and enslavement, with the aim of inducing and exploiting prostitution. This means that the primary victims of human trafficking are young women. In this context, the *cults* control the criminal activity at all stages, from recruitment to sending women to destination countries, and through to exploitation activities. Their criminal process follows specific methods and stages. According to investigations and inquiries by Italian law enforcement, the recruitment of young women largely

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[3] Relazione sull'attività svilta e sui risultati conseguiti dalla Direzione Investigativa Antimafia, 2018 (Camera dei Deputati, Doc. LXXIV, n.3)

[4] Source: ISTAT)

[5] Relazione sull'attività svilta e sui risultati conseguiti dalla Direzione Investigativa Antimafia, 2018 (Camera dei Deputati, Doc. LXXIV, n.3) and,
Attività criminali delle organizzazioni nigeriane, con una prima indagine parlamentare sulla portata della "Green Bible", 2022 (Commissione parlamentare di inchiesta sul fenomeno delle mafie e sulle altre associazioni criminali, anche straniere, Senato della Repubblica, Camera dei Deputati, Doc. XXIII n. 37 Sez. XV)

[6] Relazione sull'attività svilta e sui risultati conseguiti dalla Direzione Investigativa Antimafia, 2018 (Camera dei Deputati, Doc. LXXIV, n.3) and,
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[7] see Appendix A.1 for more details

[8] La mafia nigeriana in Italia: Focus, 2020 (Dipartimento della Pubblica Sicurezza, Direzione Centrale della Polizia Criminale)

occurs in Edo State, particularly around its capital, Benin City, where there are organized operational and logistical structures. The initial contact, approach, and persuasion of the young woman are carried out by a female figure known as a *madame*. The role of the *madame* is crucial, as she must establish a very close bond with the young woman based on traditional religious rituals called *'juju'*, which ensure the victim's loyalty to the organization and to the *madame*, under threat of death to herself and her family members. The Nigerian criminal system is based on so-called *debt bondage*, which forces victims to endure severe forms of exploitation to repay large sums of money for their freedom. In this context, when the victim undergoes the *'juju'* ritual, she agrees to repay the amount of money needed for her journey. However, in most cases, this debt increases due to additional, un-agreed costs, such as rent, bills, food, and clothing. The proceeds allow the *madame* to quickly recover her invested capital and reinvest in new young women, ensuring a continuous turnover and an expansion of her operations. The young women are entirely dependent on the *madame*, who gives them the possibility to remain in Italy, buy back their freedom, but also to engage in the exploitation of other girls alongside their perpetrator [9].

3   Data

To measure the human trafficking activities of the Nigerian Mafias in Italy, I use a restricted access dataset from the Italian Ministry of the Interior containing the number of crimes related to human trafficking committed by foreign and Nigerian citizens in the Italian Provinces (NUTS-3 Level) from January 2011 to December 2022 with a monthly frequency. In Italy, the legal framework for combating human trafficking is outlined by the Articles 600, 601, and 602 of the Penal Code. Article 600 addresses reduction and maintenance in a state of slavery or servitude, Article 601 directly addresses the issue of human trafficking, and Article 602 deals with purchase and sale of slaves. Figures 1 shows that Nigerian Mafias are the main foreign organized crime group involved in human trafficking activities in Italy. Crimes committed by non-Nigerian foreign citizens have shown a decreasing trend during the period of analysis, whereas crimes committed by Nigerians peaked in 2017. This aspect underscores the relevance of this study, in fact, despite, this phenomenon begun in late 1990s, there has been a significant recent increase in these illicit activities. Finally, of the 108 Italian provinces, those that were modified (or created) during the period of analysis (Monza-Brianza, Barletta-Andria-Trani, and South Sardinia) are excluded, resulting in a final sample of 105 provinces.

To measure climatic shocks in Edo State across the period of analysis, I used precipitation and temperature data from ERA5 (Hersbach et al., 2020) to calculate the Standardize Precipitation and Evapotranspiration Index (SPEI). Thanks to the SPEI, we are able to determine the onset, duration and magnitude of droughts conditions with respect to normal conditions and the interpretation follows the values shown in Table 1 (Beguería et al., 2014). The climate in Nigeria is characterized by three distinct climatic zones: tropical monsoon in the south; tropical Savannah in the center; and hot and semi-arid in the north. This results in a gradient where the amount of precipitation increases from north to south across the country. The northern regions of the country, have a hot and semi-arid climate, the

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[9] Relazione sull'attività svilta e sui risultati conseguiti dalla Direzione Investigativa Antimafia, 2018 (Camera dei Deputati, Doc. LXXIV, n.3)
Attività criminali delle organizzazioni nigeriane, con una prima indagine parlamentare sulla portata della "Green Bible", 2022 (Commissione parlamentare di inchiesta sul fenomeno delle mafie e sulle altre associazioni criminali, anche straniere, Senato della Repubblica, Camera dei Deputati, Doc. XXIII n. 37 Sez. XV)

wet season only lasts from June to September. The central regions, on the other hand, have a well-defined single rainy season, from April to September, and a dry season, from December to March, during which precipitation is almost completely absent. The southern regions experience major rainfall events from March to October, although there is also some precipitation from November to February. Edo State is located in the southern region of Nigeria, and as shown in Table 2, the average annual temperature ranges between 25°C and 28°C, and there is no clear distinction between wet and dry seasons, only a reduction in rainfall during the months of December, January, and February. Due to these climatic characteristics of Edo State, I consider the minimum of SPEI 12, which represents a 12-month consecutive drought condition, to identify the climatic shock. As shown in Figure 2 the minimum SPEI 12 in Edo State reached a level of -1.5 (indicating severely dry conditions) in April 2017 and remained constant throughout the year 2017. Stating that for nearly 24 months Edo State has faced severe drought conditions. In Figure 8 I show that the average SPEI 12 values of Edo State reach the minimum threshold to identify drought conditions in the same period.

Finally, to test the role of social networks in the activities of Nigerian *cults* in Italy, I used the number of Nigerians legally residing in the Italian provinces from to ISTAT.

4   Empirical Strategy

To test the first hypothesis of the paper, notably if the social network in regions of destination acts as a pull-factor for human trafficking-related activities committed by Nigerian organized crime groups, I rely on a shift-share instrumental variable (Borusyak et al., 2022). The intuition behind the use of a shift-share IV relies on the social network theory in individuals' location decisions in the expansion of mafia-like organizations outside their original territories, as described in Section 1. Figure 3 shows that Nigerian immigrants cluster geographically in Italian provinces, and newcomers tend to settle where the Nigerian community is larger. Notably, provinces with the largest Nigerian communities in 2002 are those that experienced the greatest growth during the period 2002-2023, whereas provinces with the smallest Nigerian communities in 2002 remain among those with the smallest communities even in 2023. Therefore, the fact that Nigerian migrants sort themselves among municipalities will bias the estimation of the effect of immigration on human trafficking-related crimes. The issue of endogenous immigrants is a concern in the literature and has recently been addressed using a shift-share instrumental approach (see Bove et al. (2023) and Derenoncourt (2022)). This instrument is constructed by interacting a push factor for human trafficking victims, the severe drought in Edo State, with a pull factor for Nigerian organized crime groups, namely the predetermined Nigerian community in Italian provinces. Hence, my shift-share instrumental variable consists of the interaction between the average population in Italian provinces during the period 2002-2010 (Share) and a dummy variable indicating the post-climatic shock (Shift), as described in Equation (1):

$$Z_{pt} = Av\_Nig\_Pop_p^{2002-2010} * D(SPEI12_t \leq -1.5) \tag{1}$$

Where Z_{pt} represents the Nigerian population in Italian province p at year t; $Av\_Nig\_Pop_p^{2002-2010}$ is the average Nigerian population in Italian provinces in the period 2002 - 2010 and it is calculated following Equation(2):

$$Av\_Nig\_Pop_p^{2002-2010} = \frac{1}{n} \sum_{t=2002}^{2010} \text{Nig\_Pop}_{pt} \tag{2}$$

Finally, $D(SPEI12_t \leq -1.5)$ represents a dummy variable that assumes value 1 for the years following the severe drought period in Edo State, which, as shown in Figure 2, occurred, the first time in the period of observation, in April 2017.

I estimate the effect between Nigerian immigration in Italian provinces, after the climatic shock in Edo State and human trafficking crimes following Equation (3):

$$Y_{pt} = \alpha_0 + \theta_p + \gamma_t + \widehat{Nig\_Pop}_{pt} + \varepsilon_{pt} \tag{3}$$

$$\text{First Stage: } Nig\_Pop_{pt} = \alpha_0 + \theta_p + \gamma_t + Z_{pt} + \varepsilon_{pt} \tag{4}$$

where Y_{pt} represents the percentage of crimes related to human trafficking committed by Nigerian citizens on the total number of crimes related to human trafficking committed by foreign citizens in the Italian province p in the year t. Considering the total number of crimes committed by foreigners allows me to account for both the general trend of human trafficking crimes in Italy committed by foreign citizens, and any potential increased focus on these particular illicit activities by law enforcement, which inevitably leads to an increase in this type of crime without necessarily indicating an actual increase in criminal activities. θ_p are province fixed effects used to capture time-invaring unobserved heterogeneity; γ_t are year fixed effects used to capture time-varying unobservable heterogeneity between years across all provinces; and ε_{pt} is the error term. $\widehat{Nig\_Pop}_{pt}$ represents the exogenous component of the Nigerian population obtained from the first stage of the instrumental variable shown in Equation(4).

To test the second hypothesis of the paper, which aims to investigate the intensity and timing of human trafficking following a climatic shock in Edo State, I use a dynamic difference-in-differences estimator relying on the method proposed by (Borusyak et al., 2022). The analysis spans from January 2011 to December 2022 with quarterly frequency with the period $2011\_Q1 - 2017\_Q1$ serving as pre-treatment period and the period $2017\_Q2 - 2022\_Q4$ as post-treatment period, and using the predetermined Nigerian community in Italian provinces as cross-sectional variation. In other words, I test the effect of the climatic shock in Edo State on the Italian provinces with a larger Nigerian community, using the provinces with the smallest Nigerian community as counterfactual. For this reason, I considered different thresholds of the average Nigerian population in the period 2002-2010 to determine the group of 'treated' provinces and the group of 'control' provinces, as described in Figure 4.

The main estimation is described in Equation(5) :

$$Y_{pt} = \theta_p + \gamma_t + \sum_{k=2017\_Q1}^{2022\_Q4} D(SPEI12_t \leq -1.5)) * D(Av\_Nig\_Pop_p^{2002-2010}) * D(K) + \varepsilon_{pt} \tag{5}$$

where: Y_{pt} represent the percentage of human trafficking-related crimes committed by Nigerian citizens on the number of the same group of crimes committed by foreign citizens for province p in quarter t; $D(SPEI12_t \leq -1.5))$ and $D(Av\_Nig\_Pop_p^{2002-2010})$ are dummy indicators, respectively for the period after the climatic shock in Edo State in the second quarter of 2017 and for provinces with an average Nigerian population above the thresholds described before; θ_p are province fixed effects used to capture time-invaring unobserved heterogeneity; γ_t are quarter fixed effects used to capture time-varying unobservable heterogeneity between quarters across all provinces; and ε_{pt} is the error term. Standard errors are clustered at province level.

I use the Borusyak et al. (2024) imputation estimator to solves negative-weighting issues stressed in the recent econometric literature. The method proposed by Borusyak et al. (2024) to test the parallel trend and no-anticipation assumptions consists in estimating the regression of the outcome on time and unit fixed effects only for the period before the treatment. This changes the interpretation of the event-study plots that I show below. In fact, pre-treatment coefficients are compared to the first untreated period (which corresponds to 2011_Q1), while the post-treatment coefficients are compared to the average of the pre-treatment period coefficients (Roth, 2024).

5   Results

Table 3 reports the shift-share IV models testing the first hypothesis, regarding the effect on human trafficking-related crimes of the Nigerian community in Italian Provinces after the climatic shock in Edo State. The first stage shows that a positive and significant correlation is found between the interaction of the climatic shock in Edo State and the Nigerian social network, and the number of Nigerian migrants in Italian provinces.

The general results of the second stage of the shift-share IV model specification are shown in Column (1) of Table 3. It shows that on average, for an increase of 1,000 Nigerian citizens in Italy, the percentage of human trafficking crimes committed by Nigerians increases by 40%. This implies that the greater the Nigerian migratory flow to Italy, the greater the expansion and development of the criminal network used by Nigerian Mafias, and therefore, the greater the number of human trafficking crimes committed. These results confirm that the climatic shock in Edo State increased the phenomenon of human trafficking from Nigeria to Italy, and that the Nigerian social network is also used by these organized crime groups for their illicit activities. Additionally, Columns (2), (3) e (4) of Table 3 demonstrate that all three individual human trafficking-related crimes are significant and positive, indicating that Nigerian organized crime groups are active in both human trafficking and in recruitment and introduction phases into the Italian territory (Art. 601 P.C.), as well as in the exploitation phase of the victim (Art. 600 and Art. 602 C.P.).

Figures 5, 6 e f7 show the results of the event study in the dynamic difference-in-differences with the average Nigerian population in Italian provinces during the period 2002–2010 as a mediator testing the second hypothesis of the paper. In particular, Figure 5 shows the effect of the climatic shock in Edo State on human trafficking-related crimes in provinces that had an average Nigerian community in the period 2002-2010 above the median. This figure shows that the pre-trend is largely not significant despite the presence of the same climatic shock occurring in other Federal States in southern Nigeria, as shown in Figure 2. Instead, the effect is positive and significant for the period extending up to three years after the climatic shock in Edo State (from 2018_Q1 to 2020_Q1). Additionally, the

significance of this effect follows a seasonal pattern, with the main crime peaks occurring in the first quarter of the years 2018, 2019, and 2020. Figures 6 and 7 demonstrate how the effect of the climatic shock on human trafficking crimes committed by Nigerians occurs through the Nigerian social network, validating the results obtained with the shift-share IV specification. In fact, when considering *'treated'* the provinces with an average Nigerian population above the 60th percentile and *'control'* the provinces below the 40th percentile during the period 2002–2010, the effect is higher compared to the previous model and follows the same seasonal pattern. Finally, when considering *'treated'* the provinces above the 75th percentile and *'control'* the provinces below the 25th percentile the effect increases respect to the previous models. Tables 4 and 5, compare the coefficients of the three event-study analysis in the pre- and post-climatic shock periods in Edo State. In all three models, the peak in human trafficking crimes occurs in the first quarter of 2019 (2019_Q1). The effect of the climatic shock in Edo State on human trafficking crimes ranges from 13.4% in the first model specification, to 19.6% in the second; and, finally, in the third, it reaches up to 22.9% more compared to those below the 25th percentile.

6   Robustness checks

To verify the importance of the Nigerian social network as a driver of human trafficking-related crimes following climatic shocks in Edo State, I conducted a series of falsification tests, shown in Appendix B. I shuffle and assign randomly the values of the treatment variable referring to the average Nigerian population in the period 2002-2010 at the Italian provinces expecting not significant results on crimes related to human trafficking. The main hypothesis of this test is that the causal relationship described before is not driven by spurious correlations or unobserved factors. Table 6 shows that the coefficients are not significant for both the total number of crimes, Column (1), and for single crimes, Columns (2), (3), and (4). Figures 9, 10 and 11 demonstrate that the dynamic effect of the climatic shock in Edo State is not significant when the provinces are randomly classified as 'treated' and 'controls'. Overall, these tests provide further validation for the causal interpretation of my results.

A confounding factor in the setting identified in this paper is the increasing institutional attention toward the phenomenon of illegal migration due to the European migration crisis. A very important aspect regarding the paper's setting concerns the link between immigration and the growth of right-wing parties, a phenomenon widely analyzed in the literature, which has produced mixed results (see, for instance Alonso and Fonseca (2012) and Davis and Deole (2017)). In particular, right-wing parties in Italy (Lega, Fratelli d'Italia, and Forza Italia) have focused their electoral campaigns on the fight against illegal migration. Consequently, if one of these parties is in a regional government, it may have led to greater attention on the phenomenon of human trafficking. As a result, greater institutional attention to this issue would generate an increase in human trafficking crimes without necessarily implying an actual increase in the phenomenon itself. The main hypothesis of this robustness check is that the spike in human trafficking crimes after the climatic shock in Edo State does not depend on the composition of the regional government, and the results are shown in Appendix C. The decision to include regional and not provincial governments in these robustness checks is due to the fact that, since 2014, provincial governments are not elected by universal suffrage, but rather by members of municipals councils. To test this hypothesis, I formulated a difference-in-difference model at regional level on a quarterly basis, as described in Equation 6:

$$Y_{pt} = \theta_r + \gamma_t + D(SPEI12_t \leq -1.5) * D(Right\_Party_r) + \varepsilon_{pt} \tag{6}$$

where: as temporal variation I used $D(SPEI12_t \leq -1.5)$ indicating the quarters before and after the April 2017 climatic shock in Edo State. I used as cross-sectional variation the political government composition of the latest regional elections held before the climatic shock. Therefore, the variable $D(Right_Party_r)$ identifies regions as treated if they have a regional government formed by right-wing parties after the climatic shock in Edo State. θ_r and γ_t are region and quarter fixed effects, and ε_{pt} is the error term. In both model specification standard errors are clustered at regional level.

The results of these robustness checks demonstrate that the composition of regional governments does not influence the trend of crimes related to human trafficking in Italy. In fact, as shown in Table 7 regions with a right-wing government during the period of the climatic shock in Edo State do not report more crimes related to human trafficking compared to those governed by left-wing parties. This evidence helps to conclude that my findings are not influenced by the political composition of regional governments and that the main effect if produced by the Nigerian social network close to Nigerian mafias.

Due to the fact that since 2002 the Nigerian population in Italy has been steadily increasing, the variable referring to the average Nigerian population in the period 2002-2010 has a value very close to the values of the Nigerian population during the period of analysis (see Table 8) and can therefore be considered endogenous. To address this potential endogeneity issue, I repeated the analyses using, as a mediator, the average Nigerian population in Italian provinces during the period 2002-2004. The results are presented in Table 9 in Section Appendix D and confirm the results described in the main shift-share IV model specification.

7   Conclusive Remarks and Discussion

Despite the growing attention of policy makers and scholars towards the climate-migration nexus and, in particular, towards the phenomenon of immobility, our understanding of the implication of this phenomenon remains limited. This paper tries to fill this gap in the literature, providing novel evidence on the phenomenon of human trafficking from Nigeria to Italy. Using a restricted access dataset from the Italian Ministry of the Interior containing the number of crimes related to human trafficking (Artt. 600, 601, and 602 P.C.) committed by Nigerian and foreign citizens, I show that the occurrence of a climatic shock in Edo State increases the human trafficking flows in Italy. The significance of climate-induced human trafficking flow aligns with recent global evidence suggesting that many people may become trapped in impoverished and unstable regions, making climate-induced poverty, and immobility, serious threats. In addition, I show that the role of social networks is crucial in determining where illicit activities of Nigerian cults occur in Italy. Consistent with the literature on Mafia-like organization expansion, migratory flows represent the main factor for the spread of the Nigerian Mafia illicit activities in Italy.

Two main caveats are in order regarding the limitations of this work. First, as stated by several scholars, the number of non-murder crimes suffers from under-reporting (Peri, 2004; Pinotti, 2015b). This implies that the crimes reported in the dataset used do not reflect the true extent of the human trafficking phenomenon from Nigeria to Italy. The *'juju'* ritual, the fear of retaliation, violence, fear of deportation due to the illegal migrants status are

all factors that discourage Nigerian victims of human trafficking from reporting their perpetrators (Carling, 2006). Therefore, the results of this paper capture the lower-bound effect of the phenomenon of human trafficking from Nigeria to Italy. Second, in this paper I assume that the higher the number of human trafficking crimes, the larger the scale of the phenomenon. In fact, the number of trafficking-related crimes represents the closest proxy for the flow of human trafficking victims, often unregistered migrants (or *'invisibles'*).

The policy implications of this paper are twofold and concern both the conditions in Nigeria and those in Italy. On one hand, crime, corruption, and violence are fundamental elements of Nigerian society that increasingly fuel people's desire to emigrate despite the obstacles, and for many, this may only be achievable through the violation of European immigration legislation (Carling, 2006). Hence, policies should focus on actions aimed at increasing the resilience of populations at risk, including on-farm adaptation measures and improving the efficiency of agricultural production (FAO, 2024). This would reduce the vulnerability of rural populations to climatic shocks, increase their income, and ultimately promote legal migration channels. On the other hand, the history of migration flows between Nigeria and Italy, marked by crime, corruption, and violence, has led to increased controls at European borders, which in turn has made Nigerian organized crime groups one of the few available means to migrate to Europe (Baye & Heumann, 2014; Carling, 2006; Omilusi, 2019). For this reason, policymakers should promote the opening of legal channels for climate migrants and vulnerable people to reduce immobility, illegal migration, and human trafficking.

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8   Tables

Table 1: *SPEI Values interpretation*

Moisture Category	SPEI
Extremely Wet	2.00 and above
Very Wet	1.50 to 1.99
Moderately Wet	1.00 to 1.49
Normal	-0.99 to 0.99
Moderately Dry	-1.00 to -1.49
Severely Dry	-1.50 to -1.99
Extremely Dry	-2.00 and less

Source: World Bank, (Beguería et al., 2014)

Table 2: *Seasonal Precipitation and Mean Temperature in Edo State, Nigeria*

Period	DJF		MAM		JJA		SON	
	Precipitation (mm)	Temperature (°C)	Precipitation (mm)	Temperature (°C)	Precipitation (mm)	Temperature (°C)	Precipitation (mm)	Temperature (°C)
1901-1930	63.8	27.37	468.52	27.96	731.45	25.38	597.5	26.31
1931-1960	69.29	27.63	467.3	28.12	696.49	25.42	610.79	26.47
1961-1990	58.32	27.4	435.94	27.94	781.41	25.36	575.02	26.21
1991-2020	52.48	27.94	439.29	28.37	779.45	25.73	605.72	26.58

Data Source: Climatic Research Unit (CRU) of University of East Anglia

Note: DJF: December, January, February; MAM: March, April, May; JJA: June, July, August; SON: September, October, November

Table 3: *Results Shift-Share Instrument Model Specification*

Second Stage	Human Trafficking	Crime 600 P.C.	Crime 601 P.C.	Crime 602 P.C.
	(1)	(2)	(3)	(4)
$\widehat{Nig\_Pop}_{pt}$	0.391***	0.310***	0.414***	0.331***
	(0.131)	(0.116)	(0.144)	(0.081)
Province FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
First Stage	0.389***	0.389***	0.389***	0.389***
	(0.072)	(0.072)	(0.072)	(0.072)
F-Stat	29.02	29.02	29.02	29.02
F-Stat p-value	0.000	0.000	0.000	0.000
SW Chi-squared	31.99	31.99	31.99	31.99
SW Chi-squared p-value	0.000	0.000	0.000	0.000
Observations	1,260	1,260	1,260	1,260

Notes: The Table reports the results of the first and second stage for shift-share instrument model specification. Coefficients are presented multiplied x 1,000. Column (1) represents the percentage of the sum of crimes related to human trafficking committed by Nigerians compared to foreign citizens, as described in Section 4.1. Column (2) refers only to crimes related to the Art.600 of the Penal Code; column (3) refers to crimes related to the Art.601 of the Penal Code; column (4) refers to crimes related to the Art.602 of the Penal Code. Province and year fixed effects are included. Standard errors are robust. $* \, p < 0.1$, $** \, p < 0.05$, $*** \, p < 0.01$

Table 4: *Post-Treatment Coefficients and Standard Errors for the Dynamic Difference-in-Differences Model Specifications*

Period	Median	40p - 60p	25p - 75p
2017_Q2	-0.048	-0.029	0.038
	(0.049)	(0.055)	(0.063)
2017_Q3	0.042	0.035	0.053
	(0.053)	(0.060)	(0.085)
2017_Q4	0.013	0.023	0.062
	(0.039)	(0.046)	(0.065)
2018_Q1	0.118***	0.129***	0.190***
	(0.044)	(0.050)	(0.072)
2018_Q2	0.102*	0.084	0.118
	(0.057)	(0.064)	(0.089)
2018_Q3	0.133**	0.097	0.115
	(0.063)	(0.070)	(0.082)
2018_Q4	0.038	0.050	0.066
	(0.052)	(0.060)	(0.083)
2019_Q1	0.137**	0.200***	0.237***
	(0.058)	(0.059)	(0.080)
2019_Q2	0.086	0.112**	0.130*
	(0.058)	(0.056)	(0.068)
2019_Q3	0.113**	0.083	0.130*
	(0.056)	(0.060)	(0.069)
2019_Q4	0.042	0.035	0.020
	(0.047)	(0.054)	(0.078)
2020_Q1	0.098**	0.128**	0.118*
	(0.046)	(0.055)	(0.070)
2020_Q2	-0.024	-0.021	-0.006
	(0.044)	(0.043)	(0.061)
2020_Q3	0.014	0.001	0.031
	(0.043)	(0.047)	(0.044)
2020_Q4	-0.067	-0.052	-0.057
	(0.046)	(0.054)	(0.079)
2021_Q1	0.064	0.098*	0.179**
	(0.046)	(0.053)	(0.074)
2021_Q2	-0.012	0.017	-0.003
	(0.039)	(0.041)	(0.055)
2021_Q3	0.019	0.008	-0.005
	(0.038)	(0.038)	(0.055)
2021_Q4	-0.016	0.011	0.008
	(0.042)	(0.048)	(0.061)
2022_Q1	0.047	0.042	0.020
	(0.045)	(0.051)	(0.071)
2022_Q2	0.004	0.013	-0.004
	(0.038)	(0.046)	(0.063)
2022_Q3	0.057	0.034	0.082
	(0.051)	(0.056)	(0.063)
2022_Q4	-0.011	-0.004	-0.013
	(0.030)	(0.036)	(0.036)
Province FE	✓	✓	✓
Quarter FE	✓	✓	✓
Total Observations	5040	4080	2592

Clustered Standard Errors at Province Level

*$p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 5: *Pre-Treatment Coefficients and Standard Errors for the Dynamic Difference-in-Differences Model Specifications*

Period	Median	40p - 60p	25p - 75p
2017_Q1	-0.001	-0.017	0.038
	(0.062)	(0.072)	(0.103)
2016_Q4	-0.054	-0.016	0.023
	(0.064)	(0.065)	(0.094)
2016_Q3	0.005	0.029	0.043
	(0.047)	(0.052)	(0.063)
2016_Q2	-0.023	0.008	0.086
	(0.061)	(0.066)	(0.089)
2016_Q1	0.005	0.006	0.045
	(0.039)	(0.047)	(0.063)
2015_Q4	-0.016	0.003	0.022
	(0.039)	(0.041)	(0.061)
2015_Q3	-0.038	-0.048	-0.039
	(0.053)	(0.055)	(0.079)
2015_Q2	-0.062	-0.086*	-0.097
	(0.047)	(0.047)	(0.064)
2015_Q1	-0.038	-0.047	-0.074
	(0.047)	(0.047)	(0.074)
2014_Q4	-0.018	0.024	0.001
	(0.041)	(0.037)	(0.045)
2014_Q3	-0.077**	-0.070*	-0.071
	(0.038)	(0.041)	(0.050)
2014_Q2	0.000	-0.014	-0.057
	(0.046)	(0.042)	(0.053)
2014_Q1	-0.019	0.000	-0.000
	(0.044)	(0.047)	(0.073)
2013_Q4	-0.063	-0.030	-0.046
	(0.041)	(0.037)	(0.057)
2013_Q3	-0.026	-0.031	-0.048
	(0.041)	(0.037)	(0.057)
2013_Q2	-0.021	-0.023	-0.036
	(0.043)	(0.041)	(0.063)
2013_Q1	-0.025	-0.007	-0.011
	(0.040)	(0.042)	(0.066)
2012_Q4	-0.024	0.017	-0.009
	(0.050)	(0.050)	(0.069)
2012_Q3	-0.049	-0.047	-0.071
	(0.035)	(0.033)	(0.050)
2012_Q2	-0.045	-0.055	-0.086
	(0.045)	(0.044)	(0.069)
2012_Q1	-0.010	-0.023	-0.036
	(0.035)	(0.041)	(0.063)
2011_Q4	-0.036	-0.044	-0.067
	(0.039)	(0.047)	(0.050)
2011_Q3	-0.042	-0.027	-0.042
	(0.037)	(0.039)	(0.060)
2011_Q2	-0.014	0.006	-0.027
	(0.044)	(0.048)	(0.064)
2011_Q1	0.000	0.000	0.000
	(.)	(.)	(.)
Province FE	✓	✓	✓
Quarter FE	✓	✓	✓
Total Observations	5040	4080	2592

Clustered Standard Errors at Province Level

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

9   Figures

Fig. 1: *Trend of human traffiking crimes committed by Nigerians and other foreign citizens in Italy*

Panel (a)

Panel (b)

Panel (c)

——— Crimes Committed by Nigerian Citizens
——— Crimes Committed by Foreign Citizens
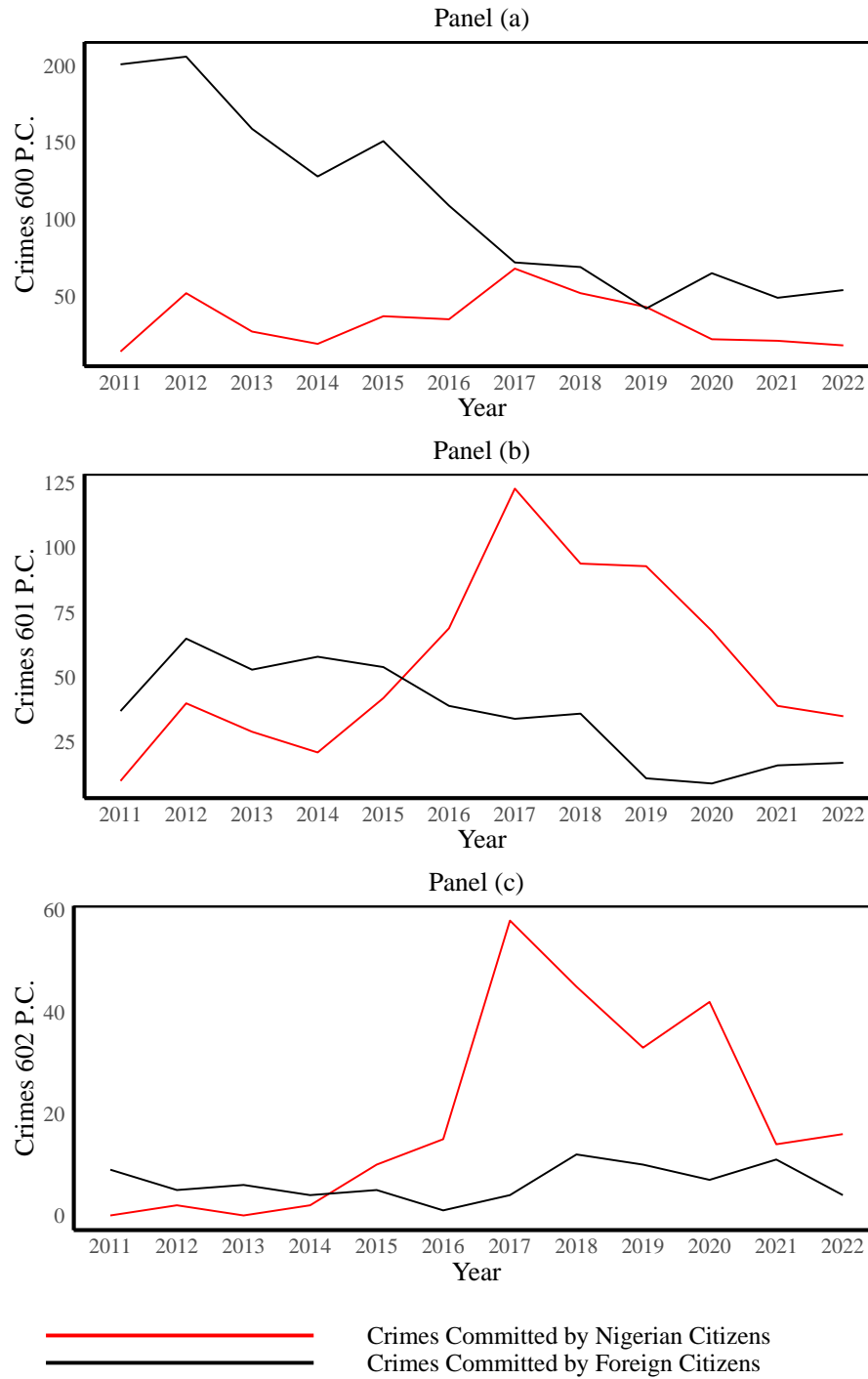
Notes: The Figure reports the evolution over time in the number of crimes relative to Art.600 (Panel (a)), Art.601 (Panel (b)) and Art.602 (Panel (c)) of the Italian Penal Code committed by Nigerian (in red) and other foreign (in black) citizens in Italy for the period 2011 - 2022.
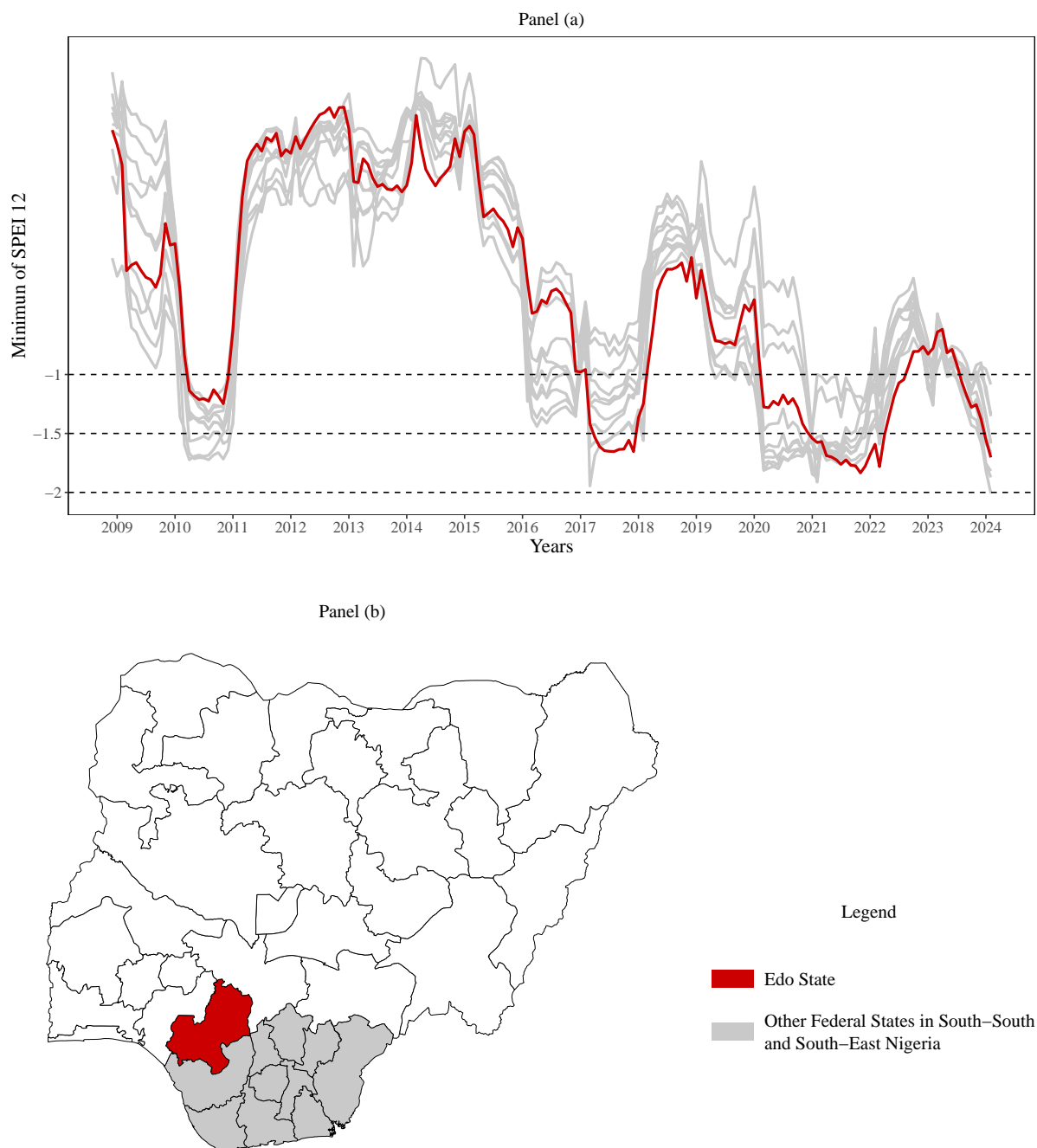
Fig. 2: *Trend of Monthly Minimum of SPEI 12 in Nigerian Federal States for the period 2009 - 2022*
Notes: The Figure reports in Panel (a) the evolution over time in the minimum values of SPEI12 (12 months of drought) over time with a monthly frequency for Edo State (in red) and other Federal States in Southern Nigeria in the period 2009-2023. The SPEI is calculated with the R package *SPEI*, data on precipitation and temperature were sourced from ERA5. Panel (b) shows Edo State and other Federal State in South-South and South-East Nigeria.

Fig. 3: *Trend of Nigerian Population in Italian Provinces from 2002 to 2023*
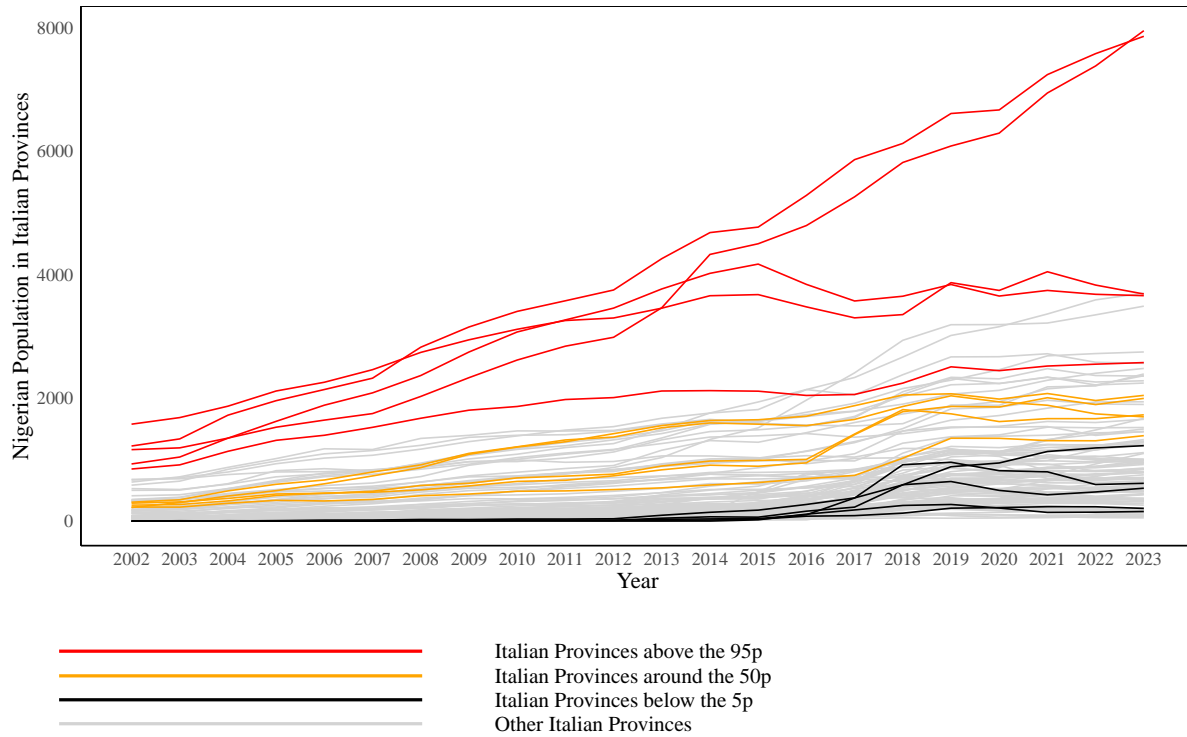
Notes: The Figure reports the evolution over time in the number of Nigerian Citizens legally resident in Italian Provinces. Provinces that are above the 95th percentile in the distribution of the variable in 2002 are plotted in red and include: Verona, Torino, Roma, Padova, and Brescia. Provinces that had the number of Nigerian citizens at the median in 2002 are plotted in orange and include: Ravenna, Cremona, Genova, Firenze, and Venezia. Provinces that had the number of Nigerian citizens below the 5th percentile in 2002 are plotted in black and include: Campobasso, Lecce, Vibo Valentia, Benevento, and Enna. All other provinces are plotted in gray. Data source: IS-TAT.

Fig. 4: *Treated and Control Groups for the dynamic difference-in-differences model specification*

Panel (a): Median   Panel (b): 40p – 60p   Panel (c): 25p – 75p

——————————   Treated Provinces

——————————   Control Provinces

——————————   Excluded Provinces
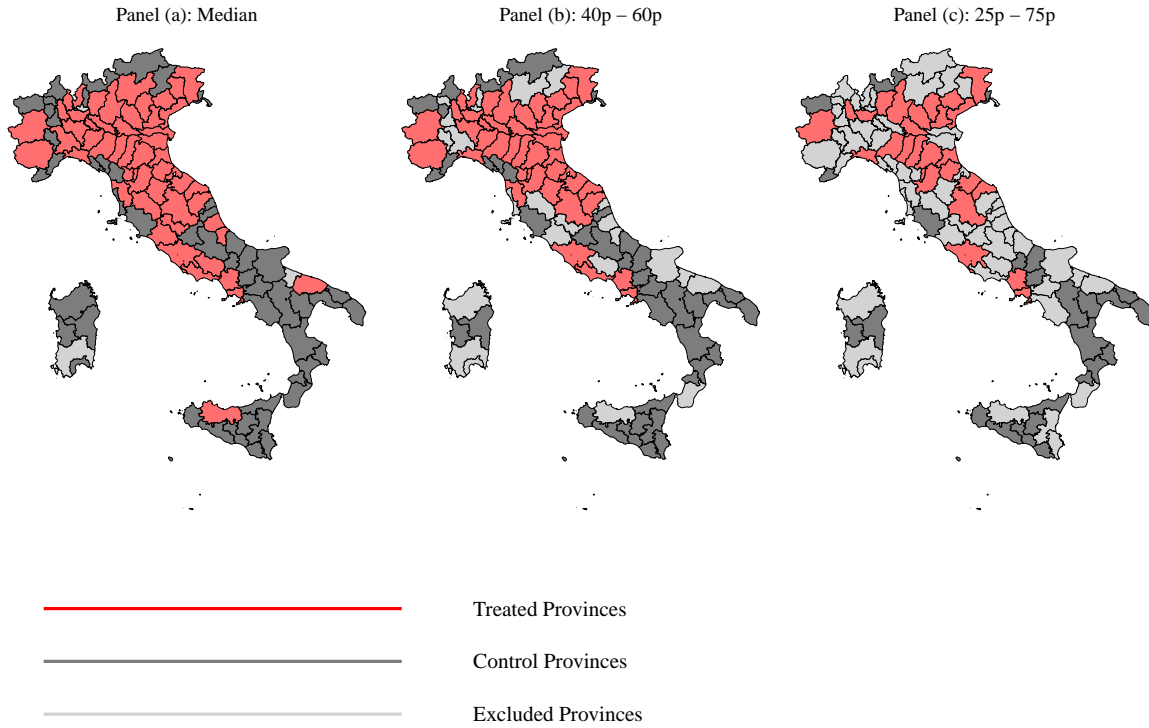
Notes: The Figure reports the *'treated'* and *'control'* Italian provinces for the dynamic difference-in-differences model specification. The treatment variable is the average Nigerian population in Italian provinces during the period 2002-2010

In Panel (a) the *'treated'* provinces are those above the median: Alessandria, Ancona, Arezzo, Bari, Bergamo, Bologna, Brescia, Caserta, Cremona, Como, Cuneo, Ferrara, Firenze, Forli'-Cesena, Frosinone, Genova, Latina, Lodi, Macerata, Mantova, Milano, Modena, Napoli, Novara, Padova, Palermo, Parma, Pavia, Perugia, Pesaro e Urbino, Pescara, Piacenza, Pisa, Pistoia, Pordenone, Prato, Ravenna, Reggio nell'Emilia, Rimini, Roma, Rovigo, Siena, Terni, Teramo, Torino, Trento, Treviso, Udine, Varese, Venezia, Verona, Vicenza, Viterbo.

In Panel (b) the *'treated'* provinces are: Ancona, Arezzo, Bergamo, Bologna, Brescia, Caserta, Como, Cremona, Cuneo, Ferrara, Firenze, Forli'- Cesena, Genova, Latina, Lodi, Macerata, Mantova, Milano, Modena, Napoli, Novara, Padova, Parma, Pavia, Perugia, Pesaro e Urbino, Piacenza, Pisa, Pistoia, Pordenone, Prato, Ravenna, Reggio nell'Emilia, Rimini, Roma, ROvigo, Torino, Treviso, Udine, Varese, Venezia, Verona, Vicenza.

In Panel (c) the *'treated'* provinces are: Ancona, Bergamo, Bologna, Brescia, Caserta, Firenze, Forlì - Cesena, Genova, Mantova, Milano, Modena, Napoli, Novara, Padova, Parma, Perugia, Pesaro e Urbino, Prato, Ravenna, Reggio nell'Emilia, Roma, Torino, Treviso, Udine, Venezia, Verona, Vicenza.

Fig. 5: *The effect of climatic shock in Edo State on human trafficking-related crimes committed by Nigerian citizens in Italy over time (Median)*
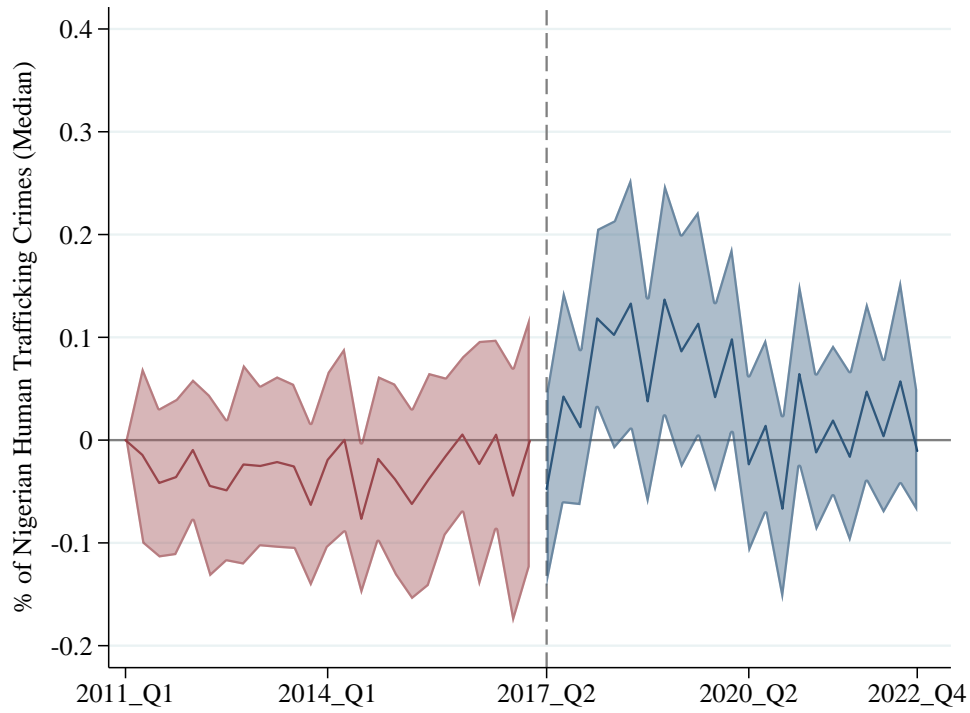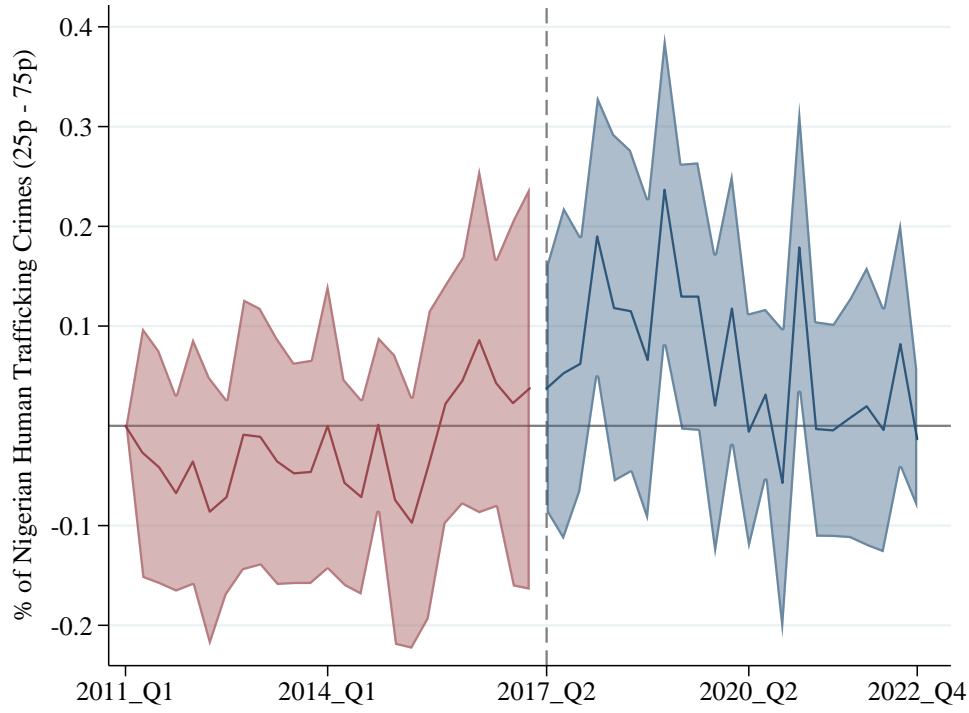

Notes: The figure shows average effects of the climatic shock in Edo State on the percentage of crimes related to human trafficking committed by Nigerian citizens in Italian provinces with an average Nigerian population above the median, compared to those with a population below the median. Average effects before and after the climatic shock are estimated using the *'imputation'* estimator of (Borusyak et al., 2024) as described in Section 4.2. Time and province fixed effects are included. Confidence intervals are at the 95% level. Standard errors are clustered at province level. Complete estimates are shown in Tables 4 and 5.

Fig. 6: *The effect of climatic shock in Edo State on human trafficking-related crimes committed by Nigerian citizens in Italy over time (40p - 60p)*
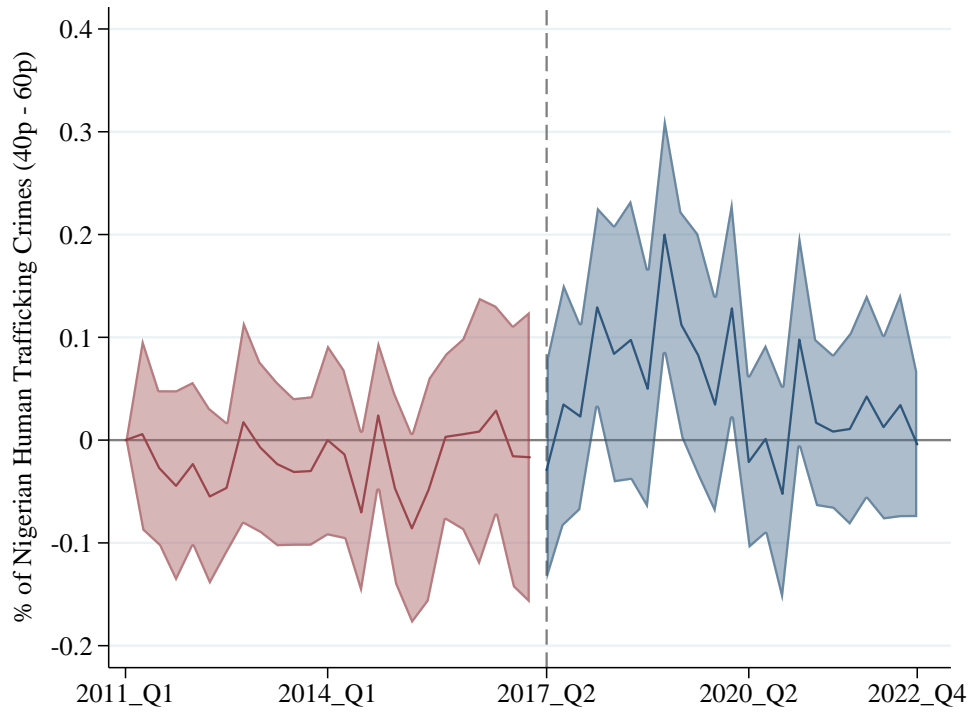
Notes: The figure shows average effects of the climatic shock in Edo State on the percentage of crimes related to human trafficking committed by Nigerian citizens in Italian provinces with an average Nigerian population above the 60th percentile, compared to those with a population below the 40th percentile. Average effects before and after the climatic shock are estimated using the *'imputation'* estimator of (Borusyak et al., 2024) as described in Section 4.2. Time and province fixed effects are included. Confidence intervals are at the 95% level. Standard errors are clustered at province level. Complete estimates are shown in Tables 4 and 5.

Fig. 7: *The effect of climatic shock in Edo State on human trafficking-related crimes committed by Nigerian citizens in Italy over time (25p - 75p)*

Notes: The figure shows the effects of the climatic shock in Edo State on the percentage of crimes related to human trafficking committed by Nigerian citizens in Italian provinces with an average Nigerian population above the 75th percentile, compared to those with a population below the 25th percentile. Average effects before and after the climatic shock are estimated using the *'imputation'* estimator of (Borusyak et al., 2024) as described in Section 4.2. Time and province fixed effects are included. Confidence intervals are at the 95% level. Standard errors are clustered at province level. Complete estimates are shown in Tables 4 and 5.

Appendix A   Additional Details

Appendix A.1   Additional Information on Crimes related to Human Trafficking

In this section I present the definition of the crimes mentioned in this paper.

The definition of human trafficking is provided by the Palermo Protocol: *'Trafficking in persons shall mean the recruitment, transportation, transfer, harbouring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation of the prostitution of others or other forms of sexual exploitation, forced labour or services, slavery or practices similar to slavery, servitude or the removal of organs'.*

Mafia-type criminal organizations are defined by the Article 416bis of the Penal Code, which states: *'A criminal organization is of Mafia-type when its members use the intimidating power granted by the membership in this association and the resulting condition of subjugation and silence to commit crimes, to acquire directly or indirectly the management or control of economic activities, concessions, authorizations, public contracts and services, or to achieve unfair profits or advantages for themselves or others, or to impede or hinder the free exercise of voting or to procure votes for themselves or others during electoral consultations'*

The definition of the three articles used to measure human trafficking-related activities are:

Article 600 P.C. states: *'(1) Anyone who exercises powers over a person equivalent to those of the rights of ownership, or anyone who reduces or keeps a person in a state of continuous subjection, forcing them into labor or sexual activities, or begging, or any other illicit activities involving exploitation, or subjecting them to organ harvesting, shall be punished with imprisonment from eight to twenty years. (2) The reduction or maintenance in a state of subjection occurs when the conduct is carried out through violence, threat, deception, abuse of authority, or taking advantage of a situation of vulnerability, physical or psychological inferiority, or a situation of necessity. It also occurs through the promise or provision of sums of money or other advantages to those who have authority over the person.'*

Article 601 P.C. states: *'(1) Anyone who recruits, introduces into the territory of the State (Italy), transfers even outside of it, transports, transfers authority over a person, hosts one or more persons who are in the conditions described in Article 600, or carries out the same acts on one or more persons, through deception, violence, threat, abuse of authority, or taking advantage of a situation of vulnerability, physical or psychological inferiority, or necessity, or through the promise or giving of money or other advantages to the person who has authority over them, with the aim of inducing or forcing them into labor, sexual activities, begging, or any other illicit activities involving exploitation or subjecting them to organ harvesting. (2) The same penalty applies to anyone, even outside the methods described in the first paragraph, who carries out the actions specified therein against a person under the age of majority.'*

Article 602 P.C. states: *'(1) Anyone, outside of the cases indicated in Article 601, who acquires, sells, or transfers a person who is in one of the conditions described in Article 600, is punished with imprisonment from eight to twenty years.'*

Appendix A.2   Average SPEI 12 in Southern Nigeria

In this section I present the average of SPEI 12 values in Edo State and other Southern Nigerian Federal States.

Fig. 8: *Trend of Monthly Mean of SPEI 12 in Nigerian Federal States for the period 2009 - 2022*

Panel (a)

Panel (b)
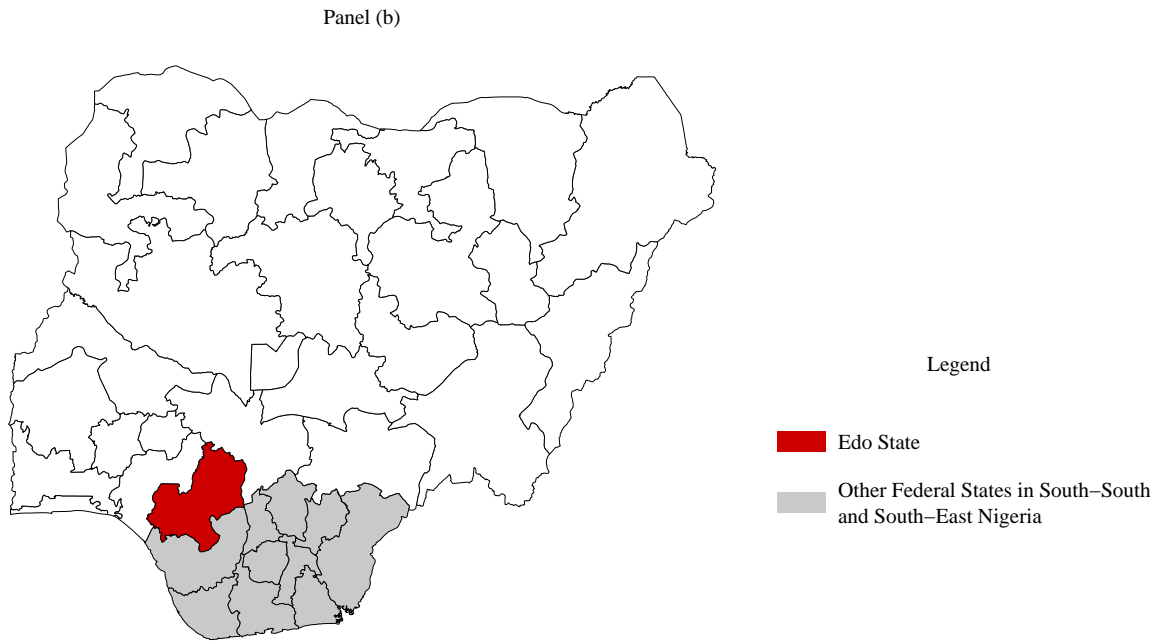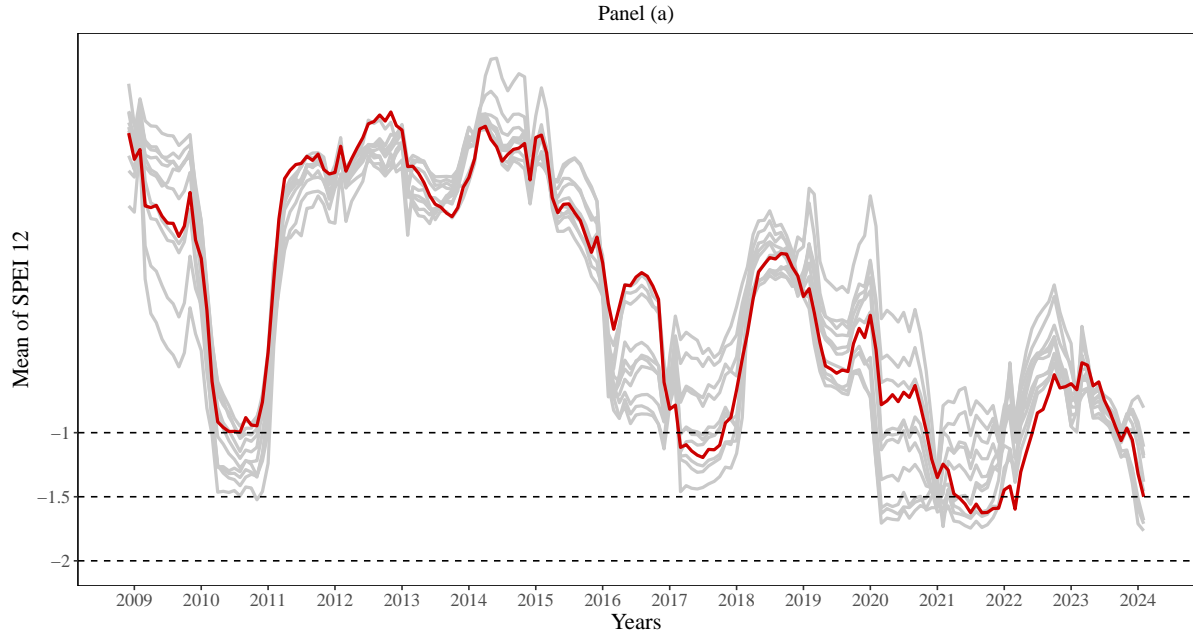
Notes: The Figure reports the evolution over time in the average values of SPEI12 (12 months of drought) over time with a monthly frequency for Edo State (in red) and other Federal States in Southern Nigeria in the period 2009-2023. The SPEI is calculated with the R package *SPEI*, data on precipitation and temperature were sourced from ERA5.

Appendix B   Falsification Tests

In this section, the results of Falsification Tests are presented. In these models, the value of the variable referring to the average Nigerian population in the period 2002-2010 is randomly assigned to the Italian provinces. In Table 6 shows the results of the Falsification Test for the model with the shift-share instrumental variable specification. In Figures 9, 10, and 11 the results of the models with dynamic difference-in-differences specification are presented.

Table 6: *Results Shift-Share Instrument Model Specification - Falsification Test*

| Second Stage	Human Trafficking	Crime 600 P.C.	Crime 601 P.C.	Crime 602 P.C.
	(1)	(2)	(3)	(4)
$\widehat{Nig\_Pop}_{pt}$	2.242	-3.895	3.063	2.974
	(7.996)	(12.91)	(10.55)	(10.28)
Province FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Observations	1,260	1,260	1,260	1260

Notes: The Table reports the results of the second stage for shift-share instrument model specification with the variable referring to the average Nigerian population in the period 2002 - 2010 assigned randomly to Italian provinces. Coefficients are presented multiplied x 1,000. Column (1) represents the percentage of the sum of crimes related to human trafficking committed by Nigerians compared to foreign citizens, as described in Section 4.1. Column (2) refers only to crimes related to the art.600 of the Penal Code; column (3) refers to crimes related to the art.601 of the Penal Code; column (4) refers to crimes related to the art.602 of the Penal Code. Provice and year fixed effects are included. Standard errors are robust. $* p < 0.1$, $** p < 0.05$, $*** p < 0.01$

Fig. 9: *Falsification Test - Random Average Nigerian Population 2002-2010 (Median)*
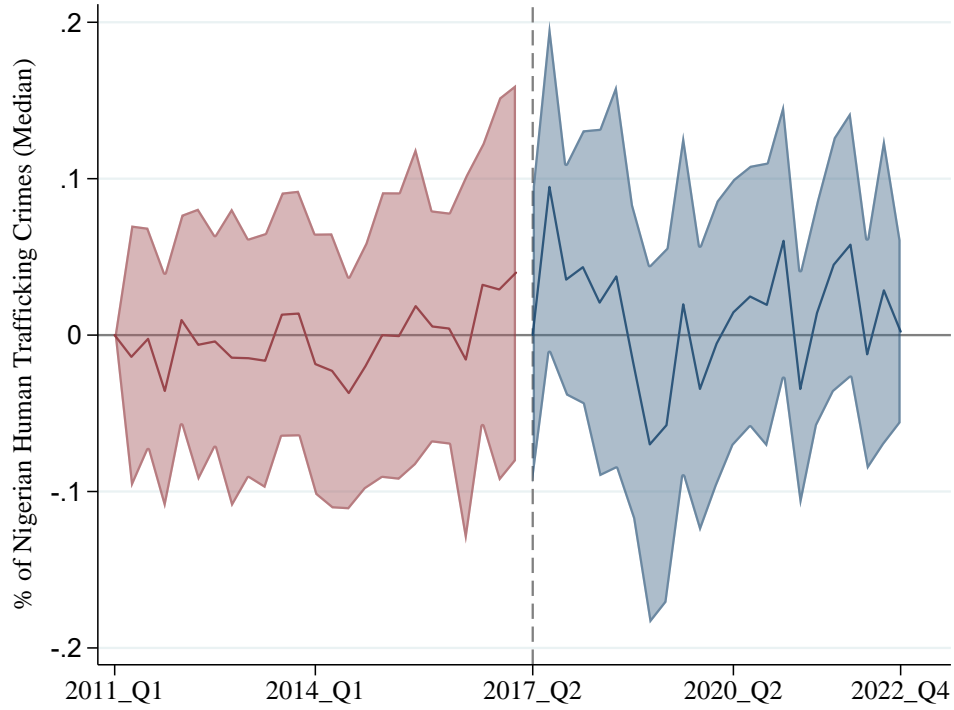
Notes: The figure shows average effects of the climatic shock in Edo State on the percentage of crimes related to human trafficking committed by Nigerian citizens in Italian provinces with an average Nigerian population (randomly assigned) above the median, compared to those with a population below the median. Average effects before and after the climatic shock are estimated using the *'imputation'* estimator of (Borusyak et al., 2024) as described in Section 4.2. Time and province fixed effects are included. Confidence intervals are at the 95% level. Standard errors are clustered at province level.

Fig. 10: *Falsification Test - Random Average Nigerian Population 2002-2010 (40p - 60p)*
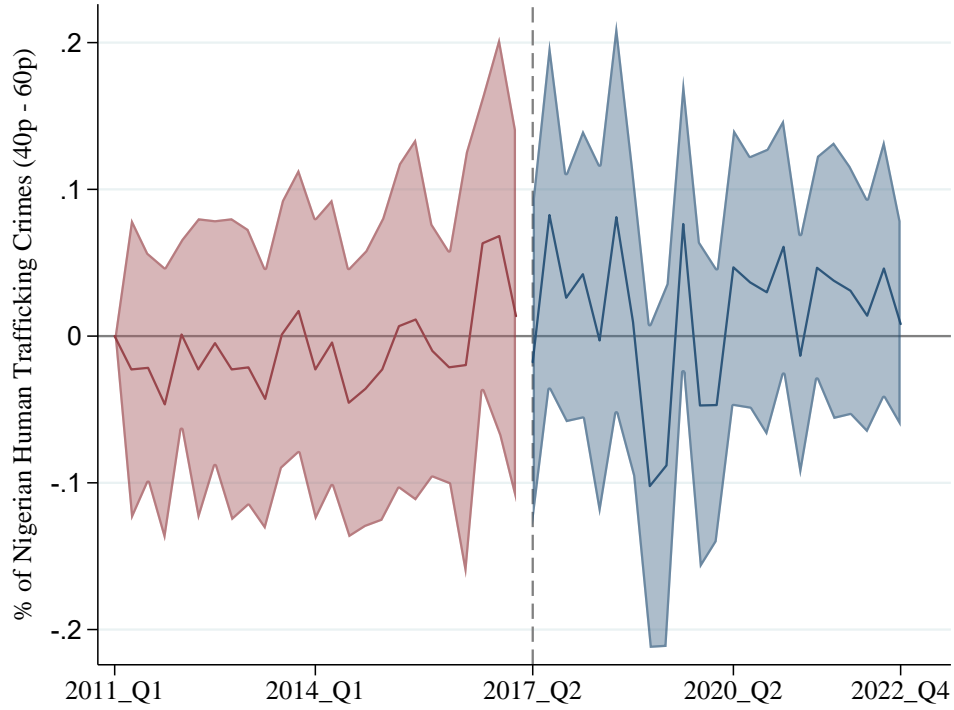
Notes: The figure shows average effects of the climatic shock in Edo State on the percentage of crimes related to human trafficking committed by Nigerian citizens in Italian provinces with an average Nigerian population (randomly assigned) above the 60th percentile, compared to those with a population below the 40th percentile. Average effects before and after the climatic shock are estimated using the *'imputation'* estimator of (Borusyak et al., 2024) as described in Section 4.2. Time and province fixed effects are included. Confidence intervals are at the 95% level. Standard errors are clustered at province level.

Fig. 11: *Falsification Test - Random Average Nigerian Population 2002-2010 (25p - 75p)*
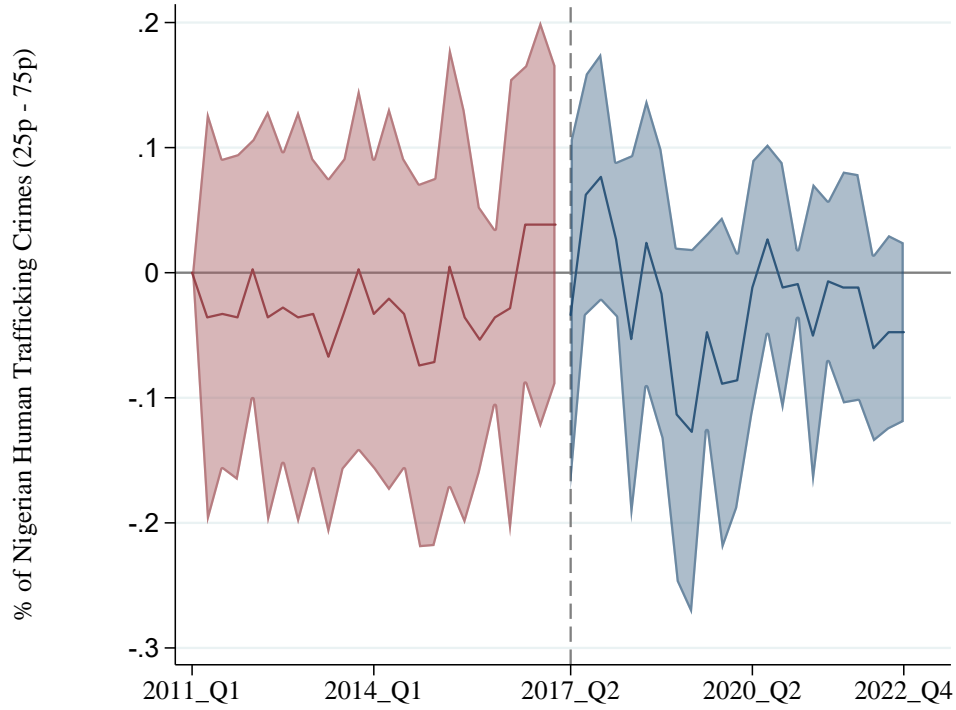
Notes: The figure shows average effects of the climatic shock in Edo State on the percentage of crimes related to human trafficking committed by Nigerian citizens in Italian provinces with an average Nigerian population (randomly assigned) above the 75th percentile, compared to those with a population below the 25th percentile. Average effects before and after the climatic shock are estimated using the *'imputation'* estimator of (Borusyak et al., 2024) as described in Section 4.2. Time and province fixed effects are included. Confidence intervals are at the 95% level. Standard errors are clustered at province level.

Appendix C   Regional governments composition

This section presents the results concerning the political composition of the regional government. In Table 7 the results of the difference-in-differences model described in Equation 6; are presented.

Table 7: *Results Difference-in-Difference model specification - Regional government composition*

	Human Trafficking	Crime 600 P.C.	Crime 601 P.C.	Crime 602 P.C.
	(1)	(2)	(3)	(4)
$D(SPEI12_t \leq -1.5) * D(Right\_Party_r)$	0.0976	-0.0324	0.139	0.161
	(0.104)	(0.058)	(0.113)	(0.138)
Region FE	✓	✓	✓	✓
Quarter FE	✓	✓	✓	✓
Observations	980	980	980	980

Notes: The Table reports the results of the difference-in-difference model specification with the regional government composition used as treatment. Column (1) represents the percentage of the sum of crimes related to human trafficking committed by Nigerians compared to foreign citizens, (2) refers only to crimes related to the art.600 of the Penal Code; column (3) refers to crimes related to the art.601 of the Penal Code; column (4) refers to crimes related to the art.602 of the Penal Code. Region and year fixed effects are included. Standard errors are clustered at regional level. $* p < 0.1$, $** p < 0.05$, $*** p < 0.01$

Appendix D   Other Model Specifications

Table 8: *Average Nigerian Population in Italy*

Variable	Mean	Std.Dev
Average Nigerian Population in 2011	462.32	701.01
Average Nigerian Population in 2002-2010	289.34	450.12
Average Nigerian Population in 2002-2004	185.31	306.47

Notes: The Table reports mean and standard deviation of the average Nigerian population in Italian provinces for the periods: 2011, 2002-2010, and 2002-2004.

Table 9: *Results Shift-Share Instrument Model Specification*

Second Stage	Human Trafficking	Crime 600 P.C.	Crime 601 P.C.	Crime 602 P.C.
	(1)	(2)	(3)	(4)
$\widehat{Nig\_Pop}_{pt}$	0.366***	0.303***	0.404***	0.322***
	(0.130)	(0.119)	(0.142)	(0.081)
Province FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
First Stage	Nig_Pop_{pt}	Nig_Pop_{pt}	Nig_Pop_{pt}	Nig_Pop_{pt}
Z_{pt}	0.573***	0.573***	0.573***	0.573***
	(0.110)	(0.110)	(0.110)	(0.110)
F-Stat	28.13	28.13	28.13	28.13
F-Stat p-value	0.000	0.000	0.000	0.000
SW Chi-squared	31.01	31.01	31.01	31.01
SW Chi-squared p-value	0.000	0.000	0.000	0.000
Observations	1,260	1,260	1,260	1,260

Notes: The Table reports the results of the first and second stage for shift-share instrument model specification using the average Nigerian population in Italian provinces between 2002 and 2004 as share. Coefficients are presented multiplied x 1,000. Column (1) represents the percentage of the sum of crimes related to human trafficking committed by Nigerians compared to foreign citizens, as described in Section 4.1. Column (2) refers only to crimes related to the Art.600 of the Penal Code; column (3) refers to crimes related to the Art.601 of the Penal Code; column (4) refers to crimes related to the Art.602 of the Penal Code. Province and year fixed effects are included. Standard errors are robust. $* \ p < 0.1, \ ** \ p < 0.05, \ *** \ p < 0.01$