EMPIRICAL ESSAYS ON THE POLITICAL ECONOMY OF HETEROGENEITY, MIGRATION, AND INSTITUTIONS

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UNIVERSITAT ROVIRA i VIRGILI

Empirical Essays on the Political Economy of Heterogeneity, Migration, and Institutions

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Empirical Essays on the Political Economy of Heterogeneity, Migration, and Institutions

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"Economics, politics, and personalities are often inseparable."

Charles Edison

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FAIG CONSTAR que aquest treball, titulat “Empirical Essays on Political Economy of Heterogeneity, Migration, and Institutions”, que presenta Yitagesu Zewdu Zergawu per a l’obtenció del títol de Doctor, ha estat realitzat sota la meva direcció al Departament d’Economia d’aquesta universitat.

HAGO CONSTAR que el presente trabajo, titulado “Empirical Essays on Political Economy of Heterogeneity, Migration, and Institutions”, que presenta Yitagesu Zewdu Zergawu para la obtención del título de Doctor, ha sido realizado bajo mi dirección en el Departamento de Economía de esta universidad.

I STATE that the present study, entitled “Empirical Essays on Political Economy of Heterogeneity, Migration, and Institutions”, presented by Yitagesu Zewdu Zergawu for the award of the degree of Doctor, has been carried out under my supervision at the Department d’Economia of this university.

Reus, 03/10/18

El/s director/s de la tesi doctoral
El/los director/es de la tesis doctoral
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Introduction

Political economy is a discipline that studies the combined and interacting effects of economic and political structures and, by extension, deals with the broader political implications on local, national and international economic behavior. Formerly, classical economists used the term *political economy* synonymously with what we call now mainstream *economics*. Hence, classical political economists assumed economic decisions are made on the basis of the political sphere. Therefore, in a context in which economic policies were not perceived as being separate from politics, the concept of political economy referred to the economic policies of nation states. The question *how does politics shape economic outcomes?* has been asked since the seventeenth century.[1]

Starting from the nineteenth century, the terminology and concept of political economy was broadened to encompass the manifold ways through which political factors at local, national and interna-

[1]Classical political economists of that period, including Adam Smith, David Ricardo, Richard Malthus, John Stuart Mill, and Karl Marx among others, were concerned about how the economy would be determined by the political structures of the society (Barnes, 1995).

tional levels are vital in determining economic outcomes. However, around this time, -in the late nineteenth century - the term *political economy* stopped serving as a synonym for mainstream *economics* in the general discourse (Besley, 2007).

It is interesting to note that during the first half of the twentieth century, scholars in mainstream economics tended to deemphasize the role of contextual factors such as political, institutional and other social influences while stressing rigor, analytical coherence, and explanations of economic trends (Baumol, 2000). By contrast, during the second half of the twentieth century, experiences with policy reforms in developing countries, as well as the multiplication of policy failures of the post-cold war period, triggered the need to integrate insights from other social sciences, to ensure a more productive interaction with the policy-making process (Csaba, 2005). Beginning in the early 1970s, an increasing number of economists have turned their attention to the old question (*how does politics affect the economic outcome?*) and exerted a significant amount of effort not only to demonstrate that political power influences on economic outcome, but also to assess its role in determining that influence (Drazen, 2002). The extensive amount of work conducted along this line has been done over many years and under a variety of names, prominent among which have been *public choice*, *rent-seeking*, and, most recently, *new institutional economics*. The pioneers include Downs (1957), North (1981), Buchanan and Tollison (1984), Tullock (1988), and Olson (1993) whose work has attracted increasing attention from economists specializing in more traditional

areas. As a consequence of all these efforts, political economy has become a component of mainstream economics (Findlay, 1990; Besley, 2007). Furthermore, these efforts lay down the groundwork in modern neoclassical economics literature for an approach that is known as the *new political economy*.

Later on in the evolution of economics, the new political economy has developed to become an essential subject area to denote how the political nature of decision making or political affairs affects policy choices and, eventually, economic outcomes. The new political economy, consisting of a mixture of rationalist politics, public choice, institutions and policy analysis, is largely described in the literature in terms of its use of the formal and technical tools of modern analysis to highlight the importance of politics for economics and/or vice-versa.[2] So, what is the new political economy? For our purpose, we can generally describe it as the study of the interaction of politics and economics and, ultimately, the political nature of decision making which affects economic choices in a society (i.e., social groups, firms, organizations or countries). The new political economy as an approach does not question the validity of the insights and relevance of mainstream economic theories (Csaba, 2005). Instead it seeks to integrate economic theories in policy-relevant insights. In Timothy Besley's words (Besley, 2007, pp. 585-586):

[2]Contemporary economics is not only used as a mathematical approach but also conceptually, by studying political phenomena related to optimization, incentives, constraints, etc. (Drazen, 2002).

> "The New Political Economy occasionally engages in debates about grand issues such as the role of states versus markets and the differences between democracy and autocracy. However, a lot of the work is focused on how the institutional details of political structure matter for policy outcomes 'in the small'. The New Political Economy rises to specific challenges. At a broad level, it is looking behind the institutions that generate policy outcomes. While this occasionally results in a more conservative appraisal of the capacity for government intervention, it also gives a way of thinking about how to make government intervention more effective. The New Political Economy is not about economic imperialism. The aim is to generate new, policy-relevant insights, particularly in areas where economists may have a comparative advantage. What we learn complements rather than substitutes knowledge generated in other branches of the social sciences. [...Therefore,] the New Political Economy is about expanding the domain of economic policy analysis and hence enhancing its relevance."

The new political economy, as articulated above, is the subject matter of this study, but it is emphatically not confined to the political economy in the literal sense of the political game, like theoretical eclecticism or political resource allocation. Our main interest is to shed light on how political factors influence economic outcomes,

and how economic conditions in turn determine political consequences. Thus, the primary focus of the current work is investigating the combination of economic and political factors that shape the characteristics of the political economy of countries. In this study, we consider some of these frontier topics- conflict, migration, and institutions.

In regard to methodology, the new political economy borrows ideas from modern mainstream economics in large part through its use of formal and technical analysis tools. As a result, methodologically, the new political economy can be broadly classified into two major categories: (i) the theoretical category, which determines a political economy equilibrium by shaping the main economic and political ideas in the formal sense of mathematical modeling as well as analytically verification; and (ii) the empirical category, which econometrically confronts the theory with relevant data. The present work seeks to offer an in-depth empirical analysis of selected political-economic issues, such as social heterogeneity, civil conflicts, international migration, and political institutions.

Heterogeneity of interests is considered as the basis of economics, and an economy certainly embraces conflicting interests among different individuals or groups. The academic discourse recognizes that heterogeneity plays a critical role in the economy. More particularly, heterogeneity of agents, markets, tests, endowments, expectations etc., understood to be essential elements, appropriately addresses the subject matter itself (Kirman, 2006; Gatti et al., 2012; Becker, 2017). Like-

wise, heterogeneity of interests is undoubtedly one of central themes of much of the discussion in the field of the new political economy. Drazen (2002) describes in great detail the importance of heterogeneity for political economy as summarized in the following two propositions (Drazen, 2002, pp.10).

> "First, heterogeneity or conflict of interests is necessary for there to be political constraints. Second, the effect of politics on economics follows from the mechanisms by which these conflicts are resolved. The first point is clear-heterogeneity is a necessary condition. It can be read as saying only that without heterogeneity, there would be nothing to study. It is the second which is really [...] defines political economy. Heterogeneity is also necessary for there to be markets, but heterogeneity of interests plays out quite differently when addressed through the market than through the political process. For example, the effect of heterogeneity of abilities on a distribution of income mediated simply through the market will be quite different than the income distribution which would result when individuals can lobby for transfers, based on their endowed abilities. How much different will depend on the political mechanism by which tax-and-transfer policy is decided. Moreover, there are numerous issues where individuals have heterogeneity of interests where the market mechanism either cannot be used or simply is not used to determine

> outcomes, the political choice mechanism being used instead".

In addition to the factors addressed, social heterogeneity is also a significant factor in relation to the political economy of countries (Collier and Hoeffler, 1998; Spolaore and Wacziarg, 2017). The current work offers a conceptual framework and quantitative analysis of the impacts of cultural heterogeneity as it relates to international market shocks to the export of primary products, and the probability of civil conflict in the developing countries. In this study we aim to show that there is indeed a strong correlation between social heterogeneity and the likelihood of civil wars relating to exogenous economic shocks. The analysis also seeks to go beyond demonstrating the links between market shocks and conflicts and attempts to reflect the effects of cultural diversity within the political economy of the sample countries (Chapter 1).

Social heterogeneity and civil conflicts at the national or local levels have further repercussions on the international political economy atmosphere. International migration, in this regard, can be understood as a coping strategy that follows changes–positive or negative (or both)- at the national or local level of the political economy. These changes depend on a broad range of factors such as security regimes, ethnic structures, governance and social networks, institutions, and access to resources (i.e., land, water, food, road, markets etc.) As Collinson (2009) suggests, major changes, and transformations at the national or

local level–including economic growth, market shocks, political crises, intra-state conflicts and/or inter-state conflicts, environmental hazards and other disasters– can transform national political economies, while people in the society are confronted with the opportunities and constraints that these changes bring. The latter effect becomes more pronounced when the changes in the political economy leave people in the society worse off and with no choice but to adapt their behavior and livelihoods to minimize the new risks. International migration, can therefore, be taken as one such survival or coping strategy. Furthermore, this author remarks:

> "[...] Specific patterns of migration are determined to a large extent by the particular interaction of individual or household livelihood strategies with a range of social, economic and political relationships, processes, institutions, and structures that make up the (historical) context in which these strategies are pursued. Migration itself represents a key process through which many communities are connected to the wider political economy, and the nature of migration experiences and relationships for different households and communities may be crucial for determining whether this connection is, on balance, adverse or positive for their overall livelihoods and wellbeing at a particular point in time" (Collinson, 2009, pp. 8).

Focusing more specifically on migration patterns from Africa to Europe, the current work also empirically examines the political economy

factors of international migrations trends. In particular, the study attempts to understand the complexities of intercontinental migration dynamics at the level of the international political economy, as well as being concerned with the broader human security perspective that combines economic and political contexts (Chapter2).

One of the central themes in the new political economy is dealing with the theoretical and empirical implications of institutional arrangements for making political choices (Besley, 2007). After North (1981) revealed the fundamental role institutions play in framing economic outcomes, there is now greater acceptance among economists that, generally, the quality of institutions really matters. In particular Acemoglu et al. (2005) argue that "good institutions" are essential conditions and factors that make countries richer or poorer, since institutions play a significant role for economic growth by shaping the incentives of principal actors in society.

This study also deals with the importance of institutional quality in the new political economy framework by seeking to determine how political institutions contribute to economic growth in relation to infrastructure capital (Chapter3). Indeed, institutional indicator variables are taken as essential determinants of the subject matter of political economy throughout the discussion presented in the current document.

This document is divided into four chapters, which are laid out below (note that each chapter is independent of the others, and therefore,

includes its own introduction and a conclusion).

Chapter 1 analyzes the impacts of social heterogeneity and exogenous economic shocks on the probability of civil conflicts. To this end, it is necessary to address central concerns including whether or not exogenous economic shocks promote civil conflicts directly and if they affect all societies alike. Hence, this chapter uses an extensive panel data sample to empirically investigate the joint impact of primary commodity export price shocks and social heterogeneity, ethnic and religious polarization and fractionalization on civil conflicts and wars. The key finding in the chapter is that in ethnically polarized societies, commodity export price shocks increase the probability of political instability. On the other hand, the effect of commodity export price shocks on civil conflicts depends on the type of income shocks and category of commodity in ethnically and religiously fractionalized (as well as religiously polarized) societies. Put simply; exogenous economic shocks affect the political stability of countries differently depending on pre-existing social structures, types of price shocks and categories of products.

Chapter 2 presents the political economy of international migration trends. Taking into consideration the contemporary phenomena of migration from Africa into Epurope, this chapter examines the crucial role that civil conflicts and other political factors play in determining patterns of migrations. To this end the chapter takes into account numerous variables of human security, including political instability,

economic growth, social heterogeneity, and political institutions, to reveal potential push and pull factors. Accordingly, in this chapter we empirically analyze the determinants of regular and asylum seeker migration flows from Africa to Europe over a significant time period. The main findings of the chapter illustrate that beyond economic determinants, factors such as increased political persecution, ethnic tension, human rights violations, political instability and civil conflicts in African source countries are all significantly associated with increased migration flows into European destination countries. Based on these findings, we suggest, as a policy recommendation, that European countries need to engage with countries of origin to overcome the current migration and refugee crisis in Europe.

Next, Chapter 3 looks at the political economy of institutions, particularly focusing on the role institutions play in relation to factors of production and growth. The empirical strategy we employ in this chapter involves estimating a simple growth model where, in addition to standard controls, infrastructure capital and institutional quality, as well as the interaction of these components, are included as explanatory variables. Taking into consideration the potential problems of estimating growth models, we seek to deal with firm additive unobserved heterogeneity that may cause endogeneity by applying a dynamic panel model approach. The findings of this chapter confirm that the interaction terms between infrastructure capital and political institutions have a positive and significant impact on economic growth.

Finally, Chapter 4 aims to show the return impact of emigrants on political stability and institutional quality in their home countries. It is noteworthy that migration contributes to the flow of goods, skills, knowledge, information, ideas and financial capital. Similarly, international migration is also an essential determinate for the process of economic development and political changes. Several possible factors could determine the nature and direction of emigrant involvement in relation to homeland political stability and enhancing or insuring institutional qualities. In this chapter, we study the effect of emigrants on the political sphere in the home state by examining the phenomenon of emigrant–activism and taking into consideration channels of the information transfer and cultural diffusion. To this end, we use cross–sectional and panel estimation techniques for a large sample of African countries as states of origin and OECD countries as destination countries.

Chapter 1

The impact of social heterogeneity and commodity price shocks on civil conflicts[1]

Overview. Do exogenous economic shocks promote civil conflicts directly? Do they affect all societies alike? The current study presents a large sample panel data evidence not only on the effect of commodity export price shocks on conflict incidence, rather than onsets, but also on the joint impact of both ethnic and religious polarization and fractionalization on political instability. In this regard, we find out that in ethnically polarized societies, the commodity export price shocks increase violence. Nonetheless, in ethnically and religiously fractional-

[1]The results of this chapter have been published at Journal of Policy Modelling.

ized societies (as well as religiously polarized), the effect of commodity export price shocks on civil conflicts depends on the type of income shocks and category of commodity. These findings contribute to the existing literature by illuminating the compound effect of both income shocks and social diversity on intrastate conflicts.

Keywords: economic shocks; conflict; ethnicity; religion; polarization; fractonalization, commodity price.

1.1 Introduction

As Pettersson and Wallensteen (2015) point out, civil conflicts (intrastate turmoil, ranging from an anti-government mass demonstration and general strikes to violent riots and civil wars) have become one of a common phenomenon throughout the world, particularly in developing countries. Indeed, there were 150 large civil wars between 1945 and 2013. The consequences of such conflicts include mass fatality, demolition of the natural environment, physical infrastructures, human capital, and social and political institutions (Blattman and Miguel, 2010).

One of the key factors behind domestic conflicts is economic situation (see Miguel et al., 2004; Bazzi and Blattman, 2014; and Musayev et al., 2014, among others). Specifically, undesirable economic circumstances may aggravate ongoing conflicts or initiate a new episode of conflict incidents (Fearon and Laitin, 2003; Collier and Hoeffler, 2004).

There are a large number of studies that examine the impact of income shocks on civil conflicts. These studies measure the income shocks through the variability of primary commodity export prices in the global market. This may be due to the fact that (i) the export price index is not affected by the actions of an individual country, and, (ii) the primary commodity prices are more volatile than manufactured commodities (Varangis et al., 2004; Ciarli and Di Maio, 2013; Kinda et al., 2016). Therefore, since the Gross Domestic Product (GDP) of developing countries are predominantly dependent on a few primary commodities, slight price changes on such commodities will affect their economic and political performances.[2]

Notwithstanding these actual facts, the literature does not provide us with a standardized and unique relationship between the economic shocks and domestic conflicts. Particularly, the theoretical determinants of price shocks on civil conflicts may be placed loosely in three channels: *the opportunity cost of fighting*, *the weakness and fragility of state*, and *the state as a prize*. It is noteworthy that through these channels both negative and positive commodity export price shocks may affect civil wars.

From *the opportunity cost of fighting* point of view, Collier and Hoeffler (2004) and Miguel et al. (2004) provide cross-country evidence about the negative relationship between growth shocks and the risk

[2]The primary products account for about half, on average, of developing countries' export earnings, and many developing countries derive the bulk of their export earnings from one or two commodities (Cashin et al., 1999).

of civil war. They argue that wages represent the opportunity cost of insurrection, assuming that conflict and production are alternative choices (Fearon and Laitin, 2003, among others).

From the perspective of *the weakness and fragility of state*, Fearon and Laitin (2003); Brinkerhoff (2005); Brückner and Ciccone (2010) and Dube and Vargas (2013) analyze the difficulties of the state to control the territory that pursue from downturns in the international price of main export commodities. Specifically, they find out that price shocks are followed by the outbreak of civil wars in developing countries.

Alternatively, Besley and Persson (2008) and Bazzi and Blattman (2014) consider the reward motivation point of view, that is, they study *the state as a prize*. In this scenario, they hypothesise that the higher the prices of exported commodities, the greater the likelihood of internal conflict.

Besides the aforementioned economic factors, identity-based social intolerance (i.e., ethnic or religious hostilities) also plays a central role in civil conflicts, especially in socially heterogeneous countries (Caselli and Coleman, 2013; Mitra and Ray, 2014). The struggle for control of economic resources among different interest groups may trigger either inter-ethnic or inter-religious grievances. In this regard, Fearon and Laitin (2003) identify that between 1945 and 1999, about 51% of civil wars originated by way of ethnic conflicts. Thus, ethnically and religious fragmented (i.e., diverse) societies promote more conflicts

than social groups characterized by class diversity (Ganepola and Thalaysingam, 2004; Lujala et al., 2005; Weinstein, 2006; Blattman and Miguel, 2010). Accordingly, Esteban and Ray (2016) further argue that a "substantial share of conflict can take place in economically similar groups. Even though the conflict is over economic resources, the deriving cleavage is non-material hence it is social identity".

In this regard, although several papers study the effects of ethnolinguistic and/or religious diversity on civil conflicts and economic growth (see for instance, Alesina et al., 2003; Forsberg, 2008; Desmet et al., 2012; Esteban et al., 2012; Papyrakis and Raveh, 2014), the joint impact of income shocks and social diversity is less analyzed. Recently, Bazzi and Blattman (2014), using price shocks to 65 globally traded commodities and 118 developing countries from 1957 to 2007, find no evidence linking commodity price shocks to conflicts in ethnically polarized countries. On the contrary, Janus and Riera-Crichton (2015), using six categories of export commodities and import price shocks for 160 countries from 1970 to 2009, find a correlation between ethnic polarization and onset of civil war.[3]

By focusing on the group's identity, which plays a key role in triggering civil conflicts where the social heterogeneity is conspicuous, we

[3]Bazzi and Blattman (2014) and Janus and Riera-Crichton (2015) differ due to (i) the lagged values: while the former tested the effects of commodity price shocks during one year and the two preceding years, the latter test price shocks using the three preceding years; and, (ii) the level of ethnic diversity: Bazzi and Blattman (2014) studied the effects of price shocks in ethnically polarized countries, but not in countries with intermediate ethnic diversity, which is covered by Janus and Riera-Crichton (2015).

analyze the influence of price shocks on civil conflicts. To the best of our knowledge, the current approach is the first attempt to consider thoroughly, both ethnic and religious diversity to discuss the influence of commodity export price shocks on civil conflicts. Furthermore, this study uses alternative measures, which makes the price shock indices stationary and removes predictable elements from the stationary process (Kinda et al., 2016). The common approach uses the change in price as a metric for shocks by a time-invariant measure of the importance of commodity prices in the economy. Such approach does not account for the potential trend related to price changes (widely discussed in Subsection 1.4.2).

Unlike the aforementioned literature, our analysis focuses on an indicator of the incidence of civil conflict rather than the onset of civil conflict to observe effects of commodity export price shocks and social diversities on political instability. Conflict incidence is a more comprehensive index that measures the outbreak of a new episode of conflict or the continuation of existing conflict. Furthermore, the onset of conflict measure presents some limitations (see Section 1.4 for further discussion). For instance, although Bazzi and Blattman (2014) argue that conflict onset and continuation follow different processes, and so should be treated differently, Bleaney and Dimico (2011) defend that including both measures is an overstatement, since these concepts presents very few theoretical differences. Additionally, from a theoretical point of view, our study is framed in the context of grievance: civil conflict is precipitated by the exclusion of certain religious or ethnic groups

from political power, or by economic inequality (Bleaney and Dimico, 2011). Empirical studies, such as Fearon and Laitin (2003), tend to find that proxies for grievance have little predictive power for the onset of civil war. Consequently, we only use the incidence of civil conflict to overcome the onset civil conflict limitations.

Specifically, our analysis yields the following three findings. Firstly, we observe that the effects of commodity export price shocks and social diversities are more robust on the outbreak of civil conflict incidences. Hence, using both aggregated and disaggregated commodities, we find out significant relationships between civil conflicts incidences and price shocks coupled with social heterogeneity. Furthermore, these results remain valid in case of conflict intensity, civil war, specific to conflict prone countries and regions, and different income level countries.

Secondly, we observe that the effect of income shocks on civil conflicts has different patterns, which is determined by the type of shocks, the nature of social diversity, and the classification of the commodity (either of labor intensive or capital intensive). We find out that positive price shocks increase the probability of insurgency civil conflict risks in more ethnically polarized societies. On the other hand, the likelihood of violence decreases with ethnically and religiously fractionalized (as well as religiously polarized) societies, when we analyze the overall income shocks. However, with these social structures, negative price shocks, increase the chance of civil conflicts. We also find out that the decline of household income and government revenue is fol-

lowed by conflict incidences in religiously diverse societies. Therefore, this result justifies that both capital and labour intensive commodities price shocks affect civil conflicts.

Finally, although Bazzi and Blattman (2014) provide no empirical evidence between war or coups and the state as a prize point of view, we find out significant and robust positive correlations between the positive commodity export shocks and conflict. This result confirms that the state prize channel remains valid in analyzing price shocks and political instability.

The remainder of this chapter is organized as follows: Sections 1.2 and 1.3 deal with the measures of social heterogeneity and the theoretical framework, respectively. Section 1.4 describes the empirical approach. Section 1.5 presents the main results and examines robustness along several dimensions. Section 1.6 offers a conclusion. Finally, Section 1.7 presents technical specifications and additional regression results.

1.2 Social diversity and conflict

In the casual relationship between economy and conflict, the existence of large inequalities in resource distribution generates social tensions and political unrest. This fact holds to be true for both developing and developed economies. In addition, in the case of developing countries, social identity serves as a structural foundation for potential group for-

mation and social conflicts. However, a conceptual understanding of social diversity may diverge according to the differences among individuals we consider, such as by ethnicity, race, gender, language, and religion. Among all of these social group formations, ethnic, linguistic, religious, or cultural identities are usually attached to social fragmentation and civil conflicts. Indeed, as Reynal-Querol (2002) notes, countries with high ethnic and religious cleavages are more vulnerable to being involved in intense conflict than those countries with conflicting claims on resources. Recent statistical evidence on civil wars also confirms that more than half of the civil conflicts in the post-World War II were related with ethnic fragmentation (Fearon and Laitin, 2003). Therefore, the likelihood of civil conflict increases with exogenous economic shocks, especially in ethnically and religiously fragmented societies.

This social diversity is measured by mean of two indices, mainly: the fractionalization and polarization indices. These indices have been used as explanatory variables in several empirical analysis, including politics, and governance studies (Easterly and Levine, 1997; La Porta et al., 1999); studies of economic growth (García Montalvo and Reynal-Querol, 2002; Alesina et al., 2003; Papyrakis and Raveh, 2014; Montalvo and Reynal-Querol, 2005); as well as ethnic conflict researches (Fearon and Laitin, 2003; Campos and Kuzeyev, 2007; Forsberg, 2008; Bhavnani and Miodownik, 2009; Desmet et al., 2012 Esteban et al., 2012).

The **fractionalization** index **FRAC** is the classical measure of social diversity. The **FRAC** originates with Hirschman (1964), and it deals with the likelihood that two randomly chosen people will be a part of different groups. Formally, if $\{n_1, n_2, ...n_m\}$ denotes the share of the population belonging to a (religious or ethnic) group m, then

$$FRAC = \sum_{i=1}^{N} n_i(1 - n_i) = 1 - \sum_{i=1}^{N} n_i^2, \tag{1.1}$$

which can be interpreted as the probability of selecting two individuals at random with different ethnic (or religious) groups.

To show how conflictual a society is, Esteban and Ray (1994) introduced the **polarization** index **P**, which is based on the inter-group perceived distances d_{ij} as well group size. Formally,

$$P = \sum_{i=1}^{m} \sum_{j=1}^{m} n_i^2 n_j d_{ij}. \tag{1.2}$$

Unlike fractionalization, the polarization index measures the existence of deep cleavages in a society. The polarization index attains its maximum value when the population is divided into two equal-sized group at some maximum distance from each other, while the fractionalization index obtains its maximum value when every individual has his or her own group, and each group is different from the rest (Esteban and Ray, 2011).

In the current approach, we use the **RQ polarization** measure proposed by García Montalvo and Reynal-Querol (2002), where the

inter-group distance is binary, i.e., d_{ij}=1 if $i \neq j$ and 0 otherwise. In doing so, polarization is characterized by the normalized distance of a particular distribution of ethnic and religious groups from a bimodal distribution. Formally,

$$RQ = \sum_{i=1}^{m} n_i^2(1 - n_i). \tag{1.3}$$

As Montalvo and Reynal-Querol (2005) argue, in order to compute the ethnic or religious P index, the distances among all different ethnic or religious groups has to be computed, which will be a very difficult process. Hence, with the RQ index, García Montalvo and Reynal-Querol (2002) propose that we assume the absolute distance between two groups is equal.

Finally, it is noteworthy that there are a multitude of contextual usages of these distributional indexes in the body of literature. Esteban and Ray (1994, 1999) studied, through the polarization index, the link between the level and pattern of social conflict (such as the generation of social tensions, revolution, and revolt or social unrest in general) with the distribution of a set of characteristics (such as wealth, ethnicity, religion, and political ideology) over a population. Easterly and Levine (1997) show that ethnic diversity has a direct negative effect on economic growth. Social polarization reduces the security of property and contract rights and, through this channel, reduces growth Keefer and Knack (2002). Similarly, using alternative data, Alesina et al. (2003), confirm that as there is a negative correlation between

ethnic, linguistic and religious fractionalization and economic growth, quality of government and policies, and GDP per capita. Montalvo and Reynal-Querol (2005) present empirical evidence that ethnic and religious polarization has a significant and negative effect on economic development. Woo (2005) shows how a fiscal instability channel negatively links social polarization and growth. Other studies reinforce the direct relation of polarization with income inequality, social diversity, and generation of social tensions (see Seshanna and Decornez, 2003; Duclos et al., 2004; Wang and Wan, 2015, among others). Likewise, Campos and Kuzeyev (2007) also find that dynamic ethnic fractionalization is negatively related to economic growth. Desmet et al. (2012) point that the deeply-rooted linguistic cleavages may limit the integration of markets, and prevent economic growth. Furthermore, social polarization and horizontal social inequality are positively related to conflict outbreak (Østby, 2008). Esteban and Ray (2011) also obtain a positive result that both ethnic and religious polarization have a significant effect on conflict.

1.3 The theoretical model

The current approach analyses conflict as the outcome of group diversification based on a pre-existing identity that may provoke by contemporary exogenous economic events. In this context, the polarization and fractionalization distributional measures are the most widely used indexes in the study of identity-based conflicts. Ethnic

and religious fractionalization and polarisation measures are the main analytical frameworks of this chapter. The presentation of the theoretical proposition in this section is based on Esteban and Ray (2011) and Esteban et al. (2012). This conflict incidence theory analyses how the equilibrium level of conflict is achieved using a behavioural model. Indeed, the group distribution plays a key role. A population is thus distributed over m groups and engaged in conflict, with N_i the number of individuals in group i and N the total number of individuals. The conflicting groups are assumed to contest to seize public (non-rivalry and non-excludable) and private (rivalry and excludable) payoffs.

Furthermore, Esteban et al. (2012) elucidate the types and natures of the two payoffs:

- The private prizes for the winning group offer political or administrative positions, specific tax breaks, bias in the allocation of or access to public resources including public expenditure, infrastructures or rents from natural resources.

- The victory also enables the winning group to enjoy public prizes in the form of power and dominance. This prize includes political power, control over public policies, imposing cultural values, religious dominance etc.

However, private prizes are dividable, whereas, public prizes are not. As a result of this nature of the prizes group size matters for the former, however, the latter is independent of the group sizes.

Let μ be the per capita value of private prizes at stake and π be the public payoffs. Enjoyment of the public payoffs is dependent on the existing institutional concessions. For instance, the winning group can impose its favourite policy or values on other groups only using the existing institutional frameworks. In addition, the payoffs to losers are also determined by their distance from the winner group. It is also assumed that if the ideal policy of group j is chosen then group i's payoff to be $u_{ij}\pi$. The inter-group distance between i and j is given as $d_{ij} \equiv u_{ii} - u_{ij}$, therefore, group i's loss from the indicated ideal policy of group j is πd_{ij}. The model view conflict as a situation in which there is no agreed-upon rule aggregating the alternative claims of different groups. Accordingly, the outcome of each group is determined significantly by the amount of "conflict resources" r that contribute by individuals in each group.[4] This implicitly means the expenditure is the cost of conflict $c(r)$ and assuming c is increasing, smooth and strictly convex, with $c'(0) = 0$. Further, aggregation of every individual's contribution of resources in group i denote by R_i. Further, the probability of winning the conflict for group i is given by $p_i = R_i/R$, where $R_N \equiv \sum_i R_i$. The per capita value of resources that are expended in conflict denoted by $\rho \equiv R_N/N$. The expected payoff, then, to an individual in group i is given as:

$$\pi u_{ii} + p_i \frac{\mu}{n_i} - \sum_{j=1}^{m} p_j \pi d_{ij} - c(r),$$

[4]The indicated resources comprises time, effort and risk Esteban et al. (2012).

where $n_i \equiv N_i/N$ is the population share of group i.

But, how are resources chosen? The model allows for a flexible specification in at one hand, individuals k of group i choose r to maximise their own payoff, at the other end, there is full intragroup cohesion and individual contributions are chosen to maximise group payoff. The expected utility of the group i members k to be:

$$U_i(k) \equiv (1-\alpha)\pi_i(k) + \alpha \sum_{\iota \in i} \pi_{ij}(\iota),$$

where, α lies between zero and one. When $\alpha = 0$, individual payoffs are maximised. When $\alpha = 1$, then group payoffs are maximised. α is open for various interpretation. It is noteworthy that the weight α could be altruism, or some measure of the extent to which group monitoring, possibly with promises and threats, manages to overcome the free-rider problem of individual contribution.

Furthermore, as aforementioned in Section 1.2 polarization and fractionalization are the most commonly used distributional indexes to the analysis of social conflicts. In addition, the Esteban and Ray (2011) theoretical model employed Greenberg-Gini index (G) to show distance d_{ij} between group i and group j that define as

$$G = \sum_{i=1}^{m} \sum_{j=1}^{m} n_i n_j d_{ij}. \tag{1.4}$$

However, it is not easy to apply this index to distributions that are

nonmonetary like ethnic, religious or political.[5] Thus, as García Montalvo and Reynal-Querol (2002) propose in this chapter we assume that $d_{ij} = 1$ for all $i \neq j$ and, of course $d_{ii} = 0$.

Based on fractionalization, polarization and Greenberg-Gini index indexes of ethnic divisions Esteban and Ray (2011) state the next proposition.

Proposition 1 (Esteban and Ray, 2011)**.** *Equilibrium per capita conflict ρ is approximately determined as follows:*

$\sigma \simeq \alpha[\lambda P + (1-\lambda)F] + \lambda(1-\alpha)\frac{G}{N} + \frac{(1-\lambda)(1-\alpha)(m-1)}{N}$,

where $\sigma \equiv \frac{c'(\rho)\rho}{\pi+\mu}$ is a measure of the intensity of conflict, $\lambda \equiv \pi/(\pi+\mu)$ is the relative publicness of the prize and α denotes the ratio of the value of the conflict to the value of the potential benefits from the conflict.

Therefore, the equilibrium level of conflict intensity is determined exogenously based on individual preferences, group size, nature and size of the prize and level of group cohesion. In other terms, the right-hand side of the given equation is explained by the three distributional measures: P, F and G/N.

In this model, the publicness of the prize refers to the effect of the polarisation, while privateness of the prize refers the effect of fractionalization. In addition, high group cohesion enhances both measures and in the meantime diminishes the effect of G/N.

[5] Esteban and Ray (2011) aregue that when groups are identified by their income, d_{ij} could be abslout or relative of income differances between i and j.

Finally, as stated in Section 1.4 the current approach, uses this conflict theory to test the effect of exogenous economic shocks and social diversity on the political stability of developing countries upon the amount of information available.

1.4 The empirical approach

We analyze the effect/impact of social heterogeneity and commodity export price shocks on the incidence of civil conflicts.

As independent variables, together with the commodity export price shocks, we use distributional indexes as well as other domestic conflict indicators. As control variables, we consider the GDP per capita, Gini indexes, population size, foreign aid per capita, institutional quality indexes and geographical proxies, which are commonly used in the conflict literature.

1.4.1 Conflict

Conflict is a very extensive and comprehensive subject matter in the social sciences. Nonetheless, since we are interested in analyzing the impact of commodities export price shocks on the political stability, we deal with violent domestic conflicts. Specifically, following the Uppsala Conflict Data Program (UCDP/PRIO) definition, an armed conflict is "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least

one is the government of a state, results in at least 25 battle-related deaths" in one calender year (Pettersson and Wallensteen, 2015). Note that, this definition of conflict is highly associated with violent conflicts that result in death tolls, a minimum 25-dead threshold per year and per dyad (consists of two conflicting primary parties).[6]

As aforementioned, we consider conflict incidence rather than conflict onset. The conflict incidence is an indicator variable that is 1 if there is a conflict in t, and 0 otherwise. Therefore, the conflict incidence is attributed 1 due to the outbreak of a new episode of conflict or the continuation of the existing conflict. Similarly, conflict onset is an indicator variable that captures conflict outbreak. However, the onset in year t is 1 if there is a conflict in t but there was no conflict in $t-1$; 0 if there is no conflict in t and $t-1$; and not defined if there was conflict in $t-1$. Hence, this measurement of conflict has limitations since, for instance, it is indistinguishable whether a conflict event has a new fresh cause or it is the continuation of a previous fight.

Furthermore, as Esteban et al. (2012) argue, the threshold definition of "onset" is "far from a sharp concept: it is arguably no difference from a year of "incidence", though to be sure, the factors that contribute to the outbreak of a conflict do not coincide with the ones that keep feeding it. Therefore, we use, in all our specifications, the measure of conflict incidence in order to avoid these shortcomings.

Accordingly, we use the data in the UCDP Monadic Conflict Onset

[6]http://www.pcr.uu.se/research/ucdp/definitions/

and Incidence Dataset (which contains a country-year version of the UCDP/PRIO Armed Conflict Dataset (ACD) v.4-2015), codes for each country and the years from 1946 to 2014.

The UCDP/PRIO database offers a yearly binary indicator, whether peace or a violent conflict occurred between named non-state armed actors and government forces that directly killed at least 25 people as thresholds. In the categorization scheme of the earlier versions of the UCDP/PRIO, ACD the intensity variable contained three categories: minor, intermediate and war.[7] However, in the new version of this database, the intensity variable is coded into two categories. "Minor", conflicts, estimated to have killed an average of between 25 and 999 individuals per year; and "War" conflicts or civil wars, that are estimated to have killed at least $1,000$ individuals in a given year (Pettersson and Wallensteen, 2015). We take both "minor" and "war" thresholds of the UCDP/PRIO dataset as a dependent variable in order to estimate the effect of price shocks in the framework of social heterogeneity.

For robustness check purpose, we also consider the impact of price shocks on an alternative measure of conflict (conflict intensity/civil war). Conflict intensity measures the magnitude of the armed conflicts. The UCDP/PRIO "Armed Conflict Dataset" describes conflict

[7]In the old versions of UCDP/PRIO, "minor" conflicts threshold estimated more than 25 battle-related deaths in a given year; "intermediate" the category was defined as "more than 25 battle-related deaths but fewer than $1,000$ per year" and, "war" whereby at least $1,000$ people per year are killed.

intensity by defining the level of conflict episodes that satisfy the minimum (UCDP/PRIO 25 deaths per year) and war (UCDP/PRIO 1,000 deaths per year). For intensity, the dataset assigned a value of 0 for "peace", for conflict events that qualify as UCDP/PRIO 25 deaths at the minimum and under UCDP/PRIO 1,000 deaths at the maximum, the dataset was assigned a value of 1, and events that recorded as UCDP/PRIO 1,000 (and above) death are assigned 2. In addition, we contemplated the impact of commodity price shocks and social heterogeneity on civil wars. We obtain civil war data from the Center for Systemic Peace dataset. The dataset computed "Major Episodes of Political Violence" (MEPV), which gives the magnitude scores of episode(s) of civil warfare involving that state in that year. It scales 1 (lowest) and 10 (highest) for each MEPV (Marshall, 2010). As magnitude scores for multiple MEPV are summed, we recode and assign a value of 1 for presence of civil war, and 0 for the case with zero episodes.

1.4.2 Commodity Price shocks

As aforementioned, the commodity export price shocks are taken as a proper indicator of exogenous economic shock, related to civil conflict. In doing so, data on world market commodity prices as well as commodity export and import values are collected for 57 globally traded commodities. We extract global commodity price data manly from the International Financial Statistics (IFS) database. Additionally, we also take price data from Global Financial Data (GFD) and

from Bazzi and Blattman (2014). The data for net export value (export minus import) was primarily extracted from the United Nations Commodity Trade Statistics Database (UN Comtrade) according to the SITC1 system as organized in 2015.[8] Finally, for multiple price series commodities, we use the average price; and, in order to fill in the missing values, we use the UN International Trade Statistics Yearbooks and Regional Statistical Yearbooks.

With these datasets, following Deaton et al. (1995); Dehn (2000); Musayev et al. (2014) and Kinda et al. (2016), we compute the price shocks index in three steps. Firstly, we develop a geometrically weighted price index for each year and country (Deaton et al., 1995):

$$PI_{i,t} = \sum_{j=1}^{n} \Pi P_{j,t}^{w_{i,j}},$$

where $PI_{i,t}$ is the commodity price index in country i for year t; $P_{j,t}$ is the world price of commodity j at time t; and $w_{i,j}$ is the country-specific weighting of the commodity at the base year (the share of commodity j in total exports).

Secondly, following Musayev et al. (2014), and Kinda et al. (2016), we take the mid-point of the sample period (1990) as the baseline. The total net export value of all commodities for which the country is a net exporter is calculated for each country. Then the individual 1990 net export values for each commodity are divided by this total in order to

[8] Whereby, the individual UN member countries gathered data from national and international sources via the United Nations Statistics Division.

achieve 1990 country-commodity specific weights, $w_{i,j}$ (when all years are not available, we take the nearest five years).

$$w_{i,j} = \frac{P_j Q_{ij}}{\sum_{j=1}^{n} P_j Q_{ij}},$$

where Q_{ij} denotes the export volume of commodity j at the base year.

As Musayev et al. (2014) state, although the purpose is to capture the price shocks rather than quantity movements, at the same time, due to the difference between abundant and scarce resource countries, it is critical to hold volumes constant. Applying this approach has important advantages. On the one hand, index does not capture any resource discoveries or any other quantity shocks after the base year. On the other hand, the index does not capture any post base year temporary volume shocks other than which may have occurred in the base year itself. It is noteworthy that this approach avoids possible endogeneity problems that may arise in the event of a volume response to price changes.

Finally, for each country, we regress the normalised price index on an intercept. In order to measure the price shocks as the estimated residuals of an econometric model of the logarithm of commodity price, regressed on its lagged values (up to three) and quadratic time trend.[9]

[9]While we compared the linear time trend and the quadratic time trend, we found the liner time trend fitted the price indexes better. Hence, we use the liner price index in our regression.

This approach helps to make the price shock indexes stationary and removes predictable elements from the stationary process.[10]

$$lnPI_{i,t} = \alpha_{i,0} + \alpha_{i,1}t + \sum_{p}^{n}\theta_{i,p}lnPI_{i,t-p} + \varepsilon_{i,t},$$

Since prices are given by the global market and are differently transmitted in each country, the latter regression has been ran for each country i separately.

1.4.3 Measure of Heterogeneity

Ethnic and religious fractionalization, as well as polarization indexes, are our core independent variables. Hence, our analysis is based on the dataset developed by Montalvo and Reynal-Querol (2005), who use various sources for both ethnic and religious diversity. On the one hand, the religious dataset is constructed from two main sources. The primary source is "L'Etal des Religious Dans le Monde (ET)", which provides relevant information to the calculation of indexes of diversity, and "The Statesman's Yearbook (ST)" is used as a supplementary source. Accordingly, the dataset considers almost all kinds of religious from the biggest religious groups to to the small collectives religious groups. On the other hand, for the ethnolinguistic diversity dataset, the basic source is the "World Christian Encyclopaedia (WCE)", which presents classifications in the form of ethnolinguistics.

[10] Applying this approach for price shock index helps to overcome the other commodity price shocks approaches disadvantages (which does not ensure that the price index is stationary). For further discussion, please refer Kinda et al. (2016).

The Montalvo and Reynal-Querol (2005) ethnolinguistic diversity dataset is mainly distinguished from the commonly used ethnic diversity index in the literature (Alesina et al., 2003; Fearon and Laitin, 2003) since they have followed the Vanhanen (1999) perception. On the one hand, the Montalvo and Reynal-Querol (2005) is distinguished from the Alesina et al. (2003) dataset on the level of disaggregation of ethnic groups, i.e., while the formers follows the Vanhanen (1999) approach to identify the relevant level of disaggregation, the latter dataset captures the more disaggregated level. On the other hand, the Montalvo and Reynal-Querol (2005) approach diverges from the Fearon and Laitin (2003) dataset by the measures of distances among groups. Although the measurement of group distances is a very strenuous process, Fearon and Laitin (2003) propose that the measuring should be a continual work in progress with respect to the expertise of specific countries, whereas Montalvo and Reynal-Querol (2005) do not contemplate the distance between groups. Therefore, we use the Montalvo and Reynal-Querol (2005) dataset for distributional indexes because the dataset consolidates both ethnic and religious indexes of the fractionalization and the polarization measures.

1.4.4 Sample Size

The availability of data for different variables from various sources, intensely limited the size of our sample. We studied 89 non-OECD member countries and 57 exportable primary commodities over the period of 1970-2014. We have a total number of 4005 of observations.

Our analysis starts by considering several indicators for the incidence of conflict and then we deal with conflict intensity and civil war pattern.

Table 1.1: Summary Statistics.

Variables	N	mean	sd	min	max
Civil conflict incidence	4,005	0.221	0.415	0	1
Civil conflict intensity	4,005	0.291	0.590	0	2
Civil war	3,780	0.122	0.396	0	3
Ethnic Polarization	4,005	0.565	0.218	0.0170	0.982
Ethnic Fractionalization	4,005	0.519	0.264	0.0320	0.959
Religious Polarization	4,005	0.586	0.325	0.00200	1
Religious Fractionalization	4,005	0.350	0.213	0.00100	0.676
Ethnic Polarization (Fearon)	4,005	0.551	0.322	0	0.990
Ethnic Fractionalization (Fearon)	4,005	0.0476	0.0534	0	0.201
Price Shocks	3,738	3.03e-10	0.582	-2.489	2.732
Log GDP Per Capita	4,005	3.001	0.600	1.761	4.750
Log Population	4,005	6.900	0.733	5.205	9.135
Log Foreign aid per capita	3,834	38.89	57.12	-50.79	722.7
Democracy	3,822	3.161	3.797	0	10
Autocracy	3,822	-3.179	3.580	-10	0
Political Rights	4,005	0.471	0.499	0	1
Civil liberty	4,005	0.499	0.500	0	1
Mountainous	4,005	15.35	20.24	0	74.50
Noncontiguous	4,005	0.101	0.302	0	1

1.4.5 The Empirical Conflict Model

In order to measure the effect of exogenous economic shocks and social heterogeneity on intrastate conflict, we regress conflict incidence in the baseline specification. The price shocks and the interaction terms with different measures of ethnic and religious diversity are the main explanatory variables. Similarly to Janus and Riera-Crichton (2015), the baseline estimation model is as follows,

$$C_{jt} = \alpha + \beta S_{j(t-1)} + \gamma S_{j(t-1)} \times (P_j + F_j) + \mu_j + \tau_t + \rho_j t + \varepsilon_{jt}, \quad (1.5)$$

where C_{jt} is an indicator of the conflict event in country j at year t, and $S_{j(t-1)}$ is the deviation of the price index from its conditional mean with up to three years lag from the past price index. We augment the basic conflict regression model by adding two variables: ethnic (religious) Polarization (P_j) and ethnic (religious) fractionalization (F_j), which can capture the effect of a country's social composition. Bazzi and Blattman (2014) and Janus and Riera-Crichton (2015), who consider lagged terms of shock as a better predictor of conflict, we use up to three-year lagged shocks instead of contemporary shocks. μ_j and τ_t are the country and year fixed effects. The country fixed effect is used to address endogenous bias that eminent from the time-invariant country characteristics. ρ_{jt} is the country-specific time trends. The idiosyncratic error term ε_{jt} captures any other unobserved characteristics of the conflict model and account for the generated price shock regresses. The econometric justification for using a year fixed effect is aimed at eliminating any potential bias from the co-movement of global shocks and global conflicts. The cluster standard errors by country, and the use of a country-specific time trend accounts for secular changes in conflict risk that may vary across countries and offers a flexible way to incorporate import price shocks (Bazzi and Blattman, 2014). In all regressions, we use robust standard errors clustered at the country level to control for serial correlation.

1.5 Results

1.5.1 Baseline Specification

The preceding literature provides heterogeneous results regarding the impacts of income shocks on civil conflicts. In particular, Bazzi and Blattman (2014) and Janus and Riera-Crichton (2015) show different effects of the commodity export price shocks on civil wars in relation to social diversity. Bazzi and Blattman (2014) conclude that in countries with ethnic heterogeneity, price declines have no clear effect on civil war onset; whereas, Janus and Riera-Crichton (2015) show that commodity terms of trade declines result in civil war with intermediate ethnic diversity (i.e. ethnic polarization).

The present study differs from the previous literature in three aspects. First, it extends the literature developed by Bazzi and Blattman (2014) and Janus and Riera-Crichton (2015), but it complements them by considering how the commodity export price shocks in societies with ethnic and religion diversity impact on civil conflicts. Second, the study considers an alternative price shocks measurement by using a regression that explains the price index by its lags and a time trend, and considers the residuals as the shock indicator. Third, the study analyzes the effect of price shocks mainly on civil conflict incidence rather than conflict onset, which has been the norm in the previous literature. For robustness check, we use conflict intensity and civil war measures of conflict.

The main analysis focuses on the impact of income variation and social heterogeneity on civil conflicts, hence we use the interaction between commodity net-export price shocks and indexes of social diversity (i.e., ethnic and religious fractionalization and polarization). Hereinafter, we provide p values in parentheses using robust standard errors adjusted for clustering at a country level. Moreover, each model is estimated controlling for country-specific time trend, year and country fixed effects. Note that all of explanatory variables are lagged one year to partly address the problem of endogeneity.

The baseline specification in Table 1.2 displays the effects of general commodity expert price changes/shocks and social diversity on civil conflicts in the sample developing countries. Each column of the table contains the lagged commodity export price shocks (ΔPS) and we continually add the distributional indices and the interaction terms between the lagged price shocks variables and the distributional indices. We generate the interaction terms, which are the product of the centered main terms (i.e. price shocks and distributional indices) that makes the interaction terms more meaningful and easy to interpret Balli and Sørensen (2013). Primarily, our analysis is based on the Montalvo and Reynal-Querol (2005) measure of distributional indices. Hence, columns 2 to 5 employ the interaction between lagged price shocks and ethnic polarization, price shocks and ethnic fractionalization, price shocks and religious polarization and price shocks and religious fractionalization, respectively. Additionally, in columns 6 and 7 we use the Fearon and Laitin (2003) ethnic polarization and fraction-

alization indices as alternative measures of ethnic diversity.

In column 1, we simply regress commodity export price shocks (ΔPS) at time $t-1$ (that is, one year earlier) on the likelihood of civil war, measured as civil conflict incidence, at time t. Although the coefficient has the expected sign, statistically it is not significant, as no surprise. In other terms, this result confirms the findings of Bazzi and Blattman (2014) and Janus and Riera-Crichton (2015) that commodity export price shocks are generally fund a weak predictor of civil conflicts when used as a stand-alone measure of conflict indicator. However, in column 2, we add variables of the ethnic polarization (ΔEP) and an interaction between the lagged commodity export price shocks and ethnic polarization ($\Delta PSEP$). In this specification the ($\Delta PSEP$) and (ΔEP) yield a positive and statistically significant coefficient while the effects (ΔPS), by itself, is positive but not statistically significant. As the interaction term is our variables of interest, a positive and statistically significant of the ($\Delta PSEP$) implies that a change to the price of the net export commodities increases the probability of civil conflict when the ethnic polarization is evaluated at its mean value. In real terms, our estimation implies that a percentage point changes in the commodity export price is associated with 0.05 percentage point increase in civil conflict incidence in ethnically polarized countries, per year. In a similar vein, regression 6 that is interaction between the price shocks and the Fearon and Laitin (2003) index of ethnic polarization ($\Delta PSEPf$), also reveals that a positive and statistically significant outcome at a confidence level of 90% (Table 1.2).

In contrast, for highly ethnically diverse societies (i.e. in the case of ethnic fractionalization), a general commodity export prices shocks are associated with a decreased probability of civil conflicts. In column 3 we estimate the (ΔPS), ethnic fractionalization (ΔEF) and the interaction of the two main variables all together. The results of regression 3 revile that ΔPS contribute positively to civil conflict incidence, but the estimated coefficients is not statistically significant. The interaction term $\Delta PSEF$, on the other hand, has negative and statistically significant coefficient. The results also indicate that the general price shocks negatively interacts with ethnic fractionalization. Holding the ethnic fractionalization at its mean value, a standard deviation change on the commodity export price decreases probability of civil conflicts approximately by -0.02 percentage points per year. Once more, this result is consistent with the Fearon and Laitin (2003) index of ethnic fractionalization, as shown in column 7 (Table 1.2).

Meanwhile, in Table 1.2 the subsequent two columns (4 and 5) report the estimation effects with religious polarization and religious fractionalization, respectively. In regression 4, we estimate the effect of price shocks on civil conflict incidences that incorporates index of religious polarization (ΔRP) and the interaction term of lagged commodity export price shocks and religious polarization ($\Delta PSRP$). The result of the regression 4 show that in religiously polarized societies, civil conflicts decline for the general commodity export price shocks. Furthermore, a standard deviation change on the commodity export price, the likelihood of civil conflict risk decrease approximately by

-0.044 percentage points per year, the religious polarization is evaluated at its mean value. Similarly, religiously fractionalized societies are at less risk of civil war that could result from general commodity export price shocks. In other words, a standard deviation change on the commodity export price decreases probability of civil conflict approximately by -0.11 percentage point per year, religious fractionalization is evaluated at its mean value.

Finally, in column 8 of Table 1.2 we estimate the effect of price shocks on civil conflict risks with ethnic polarization and fractionalization as well as religious polarization simultaneously. We observe a high degree of correlation between religious fractionalization and polarization (0.95) variables. In order to avoid the multicollinearity problem only the religious polarization has been included in the last column regression. However, the sign and significance of the interaction coefficients in our estimations remains the same independent of the specification used.

The results of the baseline specification in Table 1.2 manifest that the heterogeneous effect of the general commodity export price shocks on civil conflict incidences. An increasing effect of commodity export price shocks on the probability of civil conflicts is observed as societies are ethnically polarized, in the one hand. This prediction fits with the findings in the body of literature that investigates the link between ethnic polarization and the probability of civil conflicts. Esteban and Ray (1999) show that a two-point symmetric distribution of population

maximizes conflicts. Specifically, in the "bipolar" distribution of ethnic polarization, where a large ethnic minority (close to 50 percent) faces an ethnic majority, the probability of civil conflicts gets to a high level (Reynal-Querol and Montalvo, 2005). Dealing with the effect of ethnic polarization and commodity price shocks Janus and Riera-Crichton (2015), also show an increasing effects on the likelihood of civil war.

On the other hand, in the case of general commodity export price shocks we find that decreasing effect of price shocks when the types of social diversity is described in terms of ethnic and religious fractionalization. These result are consistent with the older cross-country literature suc as Fearon and Laitin (2003) and Collier and Hoeffler (2004), which finds that social fractionalization decreases conflict in OLS regressions. Nonetheless, we are impressed by the fact that a robust and significant negative effect of religious polarization interacting with price shocks. This ambiguity may reflect the high correlation between the index of religious polarization and fictionalization, as discussed above.

Table 1.2: Main Results

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔPS_{t-1}	0.00561	0.00195	0.00160	-0.00152	-0.0392**	0.147*	0.00645	-0.00962
	(0.0139)	(0.0136)	(0.0139)	(0.0136)	(0.0158)	(0.0816)	(0.0138)	(0.0136)
ΔEP_{t-1}		6.941***						7.327***
		(0.338)						(0.602)
$\Delta PSEP_{t-1}$		0.164***						0.226***
		(0.0390)						(0.0418)
ΔEF_{t-1}			3.688***					1.650***
			(0.186)					(0.320)
$\Delta PSEF_{t-1}$			-0.0856**					-0.0847*
			(0.0352)					(0.0463)
ΔRP_{t-1}				2.558***				-1.395***
				(0.135)				(0.401)
$\Delta PSRP_{t-1}$				-0.112***				-0.0973***
				(0.0244)				(0.0306)
ΔRF_{t-1}					4.856***			
					(0.251)			
$\Delta PSRF_{t-1}$					-0.175***			
					(0.0365)			
ΔEPf_{t-1}						-8.095***		
						(0.405)		
$\Delta PSEPf_{t-1}$						0.279*		
						(0.163)		

Continuation of Table 1.2

Varibles	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔEFf_{t-1}							2.476***	
							(0.125)	
$\Delta PSEFf_{t-1}$							-0.0683**	
							(0.0278)	
Constant	0.827***	-0.786***	0.630***	-0.246***	1.091***	-3.113***	0.374***	-0.421***
	(0.0634)	(0.0492)	(0.0562)	(0.0387)	(0.0758)	(0.154)	(0.0476)	(0.0540)
Observations	3,649	3,649	3,649	3,649	3,649	3,649	3,649	3,649
R-squared	0.474	0.477	0.475	0.477	0.477	0.475	0.475	0.482
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: The effect of ethnolinguistic and religious heterogeneity and Price Shocks on conflict Incidence. Linear Portability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Note that in the baseline specification, we consider the general case of the price shocks, i.e., negative and positive price changes together. In other words, results in Table 1.2 do not specify any particular effect of income decline on the likelihood of civil conflicts linking to social diversity. In our sample, the distribution of the positive and the negative values in price shocks index is almost equivalent. Hence, to explore the implication further, we consider the effect of income decline and income rise on civil conflict risks separately by limiting our observation distinctly to the negative price shocks and positive price shocks. This approach enables us to explain the three aforementioned stylized channels of conflicts that are related to income variations. Moreover, the approach identifies which channel is linked to a specific index of social heterogeneity.

Table 1.3, documents result in the effect of ethnolinguistic and religious heterogeneity and negative and positive price shocks on conflict incidence. In Panel A, column 2 and 4 the regression result shows that the interaction term between the lagged commodity price shocks and ethnic polarization $\Delta PSEP$ and religious polarization $\Delta PSRP$, subsequently, affect positively political stability, but the estimated coefficients are not statistically significant. On the other hand, in columns, 3 and 5 income declines are associated with increasing the probability of civil conflicts, where the social heterogeneity of the analyzed countries are characterized by ethnic and religious fractionalization. Quantitatively, while a standard diversion declines in the commodity price, the likelihood of civil conflict increases by 0.03 percentage

points per year, in the case of ethnic fractionalization interacting with the lagged of commodity export negative price shocks ($\Delta PSEF$), by holding ethnic fractionalzation index on its mean. Correspondingly, the interaction between the lagged commodity export negative price shocks and religious fractionalization ($\Delta PSRF$) also imply that every standard deviation decreasing in the net export commodity prices increases the probability of civil conflict in 0.06 percentage points per year.

When the commodity export prices fall in primary commodity exporting countries, in particular, affects the household's income, and livelihoods, as well as government's revenue. Especially, low-income social groups with their limited resilience become vulnerable to shocks. In this sense, the literature links income decline with the opportunity cost of fighting (see Fearon and Laitin, 2003). The main argument is that when incomes are higher, the cost of the insurgency is higher, as is the cost of defending against it, simply because the recruiting of fighters is more expensive. However, when incomes are lower insurgency may break out due to lower cost of fighting. Therefore, deteriorated socioeconomic situations may motivate individuals to increase their benefits by engaging in rebellion, which intensifies conflicts between a particular social group and the government. Hence, in such societies the opportunity cost of engaging in conflict is small (see for instance, Hirshleifer, 1995; Miguel et al., 2004; Dal Bó and Dal Bó, 2011). Our findings in columns 3 and 5 support the hypothesis of "opportunity cost" as a possible channel of conflict in relation to income decline, in

particular with ethnically and religiously fractionalized societies.

In addition, decreasing income in relation to negative commodity price shocks may directly affect the state capacity by lowering government revenue.[11] This internal situation may push the government to adjust the budgets in order to accommodate revenue shortfall. This also indirectly affects the economic growth of a country through balancing macroeconomic variables, as well as through increasing the government expenditure on pro-poor programs etc. Hence, a weak state capacity limits the government to address public demands, and to resolve social antagonisms. Furthermore, such weak government capacity combined with inadequate security and compromised institutional integrity result to fragile political stability. Results in Panel A of Table 1.3, clearly show that with lower income and ethnically and religiously fractionalized societies, the probability of conflict seems to increase. Thus, the results supports the hypothesis of "weakening state capacity" as a civil conflict channel setting with decreasing income.

On the other hand, Panel B in Table 1.3, reports findings for commodity export positive price shocks. In column 2, the regression result reports that positive and statistically significant coefficient for the presence positive price shocks. In this specification, we estimate the interaction between the lagged commodity export positive price shocks

[11] With regard to the impact of adverse commodity price shocks Kinda et al. (2016) show that negative shocks to commodity export prices lower GDP growth, government revenues, and savings, while the shocks increase debt in foreign currency and unemployment. Such economic slowdown and unemployment, combined with savings withdrawal, etc., jeopardize the government capacity.

and the ethnic polarization ($\Delta PSEP$). Accordingly, the result shows that a standard deviation is increasing in commodity export price rises, then the probability of civil conflicts by 0.11 percentage points, holding the index of ethnic polarization on its mean. While we compare the magnitude of conflicts by taking into consideration sizes of coefficients with respect to $\Delta PSEP$, we find a larger coefficient in the case of positive price shocks (0.727), than in the general price shocks case (0.164).

Once more the estimation findings for the positive price shocks on commodity exports state the validity of "state prize" hypothesis as a potential channel of insurgency break out relating to income rising. In other words, our finding justifies that an instant increase in the rent that is controlled by a state can become a source of political destabilization in ethnically polarized countries by motivating insurgent groups (i.e., ethnic groups that are bereft of the power) to capture the state power, given institutional constraints. In addition, the positive commodity export shocks may channel conflicts in relation to the pre-existing structure of social status. Typically, there could be ethnic, religious or geographic-specific products. This can be dictated by environment, type of soil, nature of livelihood and type of production culture of a specific society. We can consider, for instance, capital-intensive and labor-intensive type of production (Abidoye and Calì, 2015; Dube and Vargas, 2013). If, suddenly, the price of some commodities of a specific production sector goes up significantly, then, some ethnic or religious groups may be much richer in contrast to other

groups. In this regard, Mitra and Ray (2014) find that in India the Hindu attacks against Muslims systematically follow a period of differential wealth growth among the Muslims. Hence, the conflict may be due to the heterogeneity of products as one of the ethnic groups may make enough money from the positive shock to buy arms to use in the next season. As larger natural resource rents appropriable by government increase the gain from fighting, likewise the positive price shocks for commodity exports have substantial incentive to capture the government.

Finally, the social heterogeneity indices (i.e., ethnic and religious polarization and fractionalization) have a divergent effect on civil conflicts in relation to changes in the commodity export prices. Our findings show that the magnitude of increase or decrease on conflicts is determined by the type of commodity export price shocks interacting with the ethnic and religious diversity indices.

Table 1.3: The effect Negative and Positive Price Shocks

Panel A: Negative Shocks							
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔPS_{t-1}	0.0138	0.0137	0.00547	0.0127	-0.0139	0.193	0.0141
	(0.0200)	(0.0199)	(0.0203)	(0.0199)	(0.0244)	(0.140)	(0.0200)
ΔEP_{t-1}		6.409***					
		(0.450)					
$\Delta PSEP_{t-1}$		-0.00510					
		(0.0610)					
ΔEF_{t-1}			3.447***				
			(0.250)				
$\Delta PSEF_{t-1}$			-0.114**				
			(0.0573)				
ΔRP_{t-1}				2.471***			
				(0.177)			
$\Delta PSRP_{t-1}$				-0.0625			
				(0.0407)			
ΔRF_{t-1}					4.629***		
					(0.332)		
$\Delta PSRF_{t-1}$					-0.119*		
					(0.0614)		
ΔPSf_{t-1}						12.54***	
						(2.049)	
$\Delta PSEPf_{t-1}$						0.247	

Continuation of Table1.3

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
						(0.465)	
ΔEFf_{t-1}							-6.085***
							(0.997)
$\Delta PSEFf_{t-1}$							-0.0102
							(0.0822)
Constant	0.814***	-0.602***	0.625***	-0.207***	1.074***	-2.827***	0.389***
	(0.0672)	(0.0573)	(0.0571)	(0.0402)	(0.0843)	(0.217)	(0.0454)
Observations	1,381	1,381	1,381	1,381	1,381	1,381	1,381
R-squared	0.512	0.512	0.513	0.513	0.513	0.512	0.512
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Panel B: Positive Shocks							
ΔPS_{t-1}	0.0581	0.00525	0.0591	0.0591	0.0282	0.771*	0.0596
	(0.0836)	(0.0756)	(0.0836)	(0.0834)	(0.0710)	(0.402)	(0.0872)
ΔEP_{t-1}		-8.709***					
		(0.678)					
$\Delta PSEP_{t-1}$		0.727***					
		(0.266)					
ΔEF_{t-1}			-19.70***				
			(1.611)				
$\Delta PSEF_{t-1}$			-0.122				
			(0.224)				

Continuation of Table1.3

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔRP_{t-1}				-1.920***			
				(0.166)			
$\Delta PSRP_{t-1}$				-0.0710			
				(0.167)			
ΔRF_{t-1}					-3.827***		
					(0.306)		
$\Delta PSRF_{t-1}$					-0.152		
					(0.227)		
ΔEPf_{t-1}						-8.736***	
						(0.468)	
$\Delta PSEPft-1$						0.527	
						(0.396)	
ΔEFf_{t-1}							2.523***
							(0.106)
$\Delta PSEFf_{t-1}$							0.0477
							(0.0824)
Constant	1.198***	0.790***	-3.775***	0.179***	-0.876***	-3.053***	-3.942***
	(0.0912)	(0.0616)	(0.333)	(0.0463)	(0.0999)	(0.370)	(0.352)

Continuation of Table1.3

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
Observations	1,358	1,358	1,358	1,358	1,358	1,358	1,358
R-squared	0.521	0.524	0.522	0.521	0.521	0.522	0.521
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Note: Linear Probability Model estimates with robust standard errors clustered by country are in parentheses. All regressions include country and year fixed effects, and country-specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

1.5.2 Labour and capital intensive commodities

In this subsection, we estimate the disaggregated commodity shocks by distinguishing between different types of commodities that may vary in their publicness versus privateness of the conflict payoffs. Table 1.4 deals with subcategories of commodity export price shocks effects on civil conflict risks. Accordingly, we classified the types of commodities into two subcategories: agricultural and mineral. This classification helps to distinguish the effect of labor-intensive (agricultural products), and capital-intensive (minerals and energy products) export price shocks on conflicts, in various type of social diversity. The rationality of this classification is to particularize the type prize. As Esteban and Ray (2011) define conflicting groups are assumed to contest to seize public or private payoffs. By assuming that in most of developing countries agricultural commodities are mainly owned by individuals, export price shocks in these type of commodities affect privateness of the prize. Whereas the minerals and energy commodities, predominately, considered to be public properties. So, price shocks on this commodities are associated with public prizes. In doing so, we test whether civil conflicts distinct from or affected by a specific type of prize that depends on the type of commodities.

Panel A of Table 1.4 presents the agricultural commodities export negative price shocks and their effects on a domestic conflict in relation to different set of social diversity. Unlike other commodities in the sample, almost all countries export agricultural commodities. The re-

sults in columns 4 and 5 of Table 1.4 exhibit that the interaction terms between the agricultural commodity export price shock and religious diversity have increasing effect on civil conflict risks at 90% confidence interval. Similarly, in the Colombian particular case, Dube and Vargas (2013) find that a sharp fall in coffee prices during the 1990s lowered wages and increased violence in more coffee cultivating regions.

The capital-intensive commodities estimation results, presented in the same table, Panel B. The results exhibit interesting patterns. The regression result in column 3 suggests that, the mineral commodities export price fall will decreases the probability of civil conflict incidence by 0.008 percentage points while the ethnic fractionalization index remains on its mean. Whereas the mineral commodity price reduce will increases the likelihood of conflict risks by -0.054 and -0.012 percentage points in religiously polarized and fractionalized societies.

Table 1.4: Results for subcategories of commodities

Panel A: Labour Intensive Commodities							
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔPS_{t-1}	-0.00899	0.0634	0.0787	0.102	0.0780	-0.00731	-0.0269
	(0.0652)	(0.105)	(0.0858)	(0.101)	(0.0942)	(0.0651)	(0.102)
ΔEP_{t-1}		5.558***					
		(0.862)					
$\Delta PSEP_{t-1}$		-0.153					
		(0.186)					
ΔEF_{t-1}			2.991***				
			(0.471)				
$\Delta PSEF_{t-1}$			-0.217				
			(0.156)				
ΔRP_{t-1}				2.142***			
				(0.339)			
$\Delta PSRP_{t-1}$				-0.234*			
				(0.125)			
ΔRF_{t-1}					4.016***		
					(0.633)		
$\Delta PSRF_{t-1}$					-0.339*		
					(0.196)		
ΔEPf_{t-1}						-6.683***	
						(1.026)	
$\Delta PSEPf_{t-1}$						-0.500	

Continuation of Table 1.4

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
						(0.757)	
ΔEFf_{t-1}							2.050***
							(0.316)
$\Delta PSEFf_{t-1}$							0.0341
							(0.147)
Constant	0.619***	-3.491***	-1.046***	-1.344***	-1.171***	0.725***	-0.783***
	(0.127)	(0.524)	(0.156)	(0.201)	(0.175)	(0.142)	(0.116)
Observations	1,204	1,204	1,204	1,204	1,204	1,204	1,204
R-squared	0.451	0.451	0.452	0.453	0.453	0.451	0.451
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Panel B: Capital intensive Commodities							
ΔPS_{t-1}	-0.0223	-0.0262	-0.0181	-0.0197	-0.0546**	0.0308	-0.0236
	(0.0204)	(0.0218)	(0.0201)	(0.0199)	(0.0240)	(0.139)	(0.0206)
ΔEP_{t-1}		-6.215***					
		(0.655)					
$\Delta PSEP_{t-1}$		0.0433					
		(0.0595)					
ΔEF_{t-1}			-15.05***				
			(1.582)				
$\Delta PSEF_{t-1}$			-0.108*				
			(0.0599)				
ΔRP_{t-1}				-1.573***			
				(0.166)			

Continuation of Table 1.4

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
$\Delta PSRP_{t-1}$				-0.111***			
				(0.0393)			
ΔRF_{t-1}					-3.096***		
					(0.326)		
$\Delta PSRF_{t-1}$					-0.168***		
					(0.0602)		
ΔEPf_{t-1}						-5.350***	
						(0.605)	
$\Delta PSEPf_{t-1}$						0.108	
						(0.279)	
ΔEFf_{t-1}							-16.34***
							(1.706)
$\Delta PSEFf_{t-1}$							-0.0451
							(0.0363)
Constant	0.817***	0.754***	-2.540***	0.0907	-0.710***	-1.884***	-2.617***
	(0.113)	(0.108)	(0.269)	(0.0669)	(0.0952)	(0.229)	(0.274)
Observations	2,337	2,337	2,337	2,337	2,337	2,337	2,337
R-squared	0.516	0.517	0.516	0.516	0.516	0.516	0.516
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Note: Liner Probability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country-specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

1.5.3 Robustness Checks

We also test the robustness of the baseline results to the inclusion of other variables that have been found to be significantly related to civil conflicts. Furthermore, we check the robustness of our findings using alternative dependent variables such as civil war and conflict intensity, as well as using particular specifications such as control for low-income economies, control for regional dummies and conflict prone countries.

In Table 1.5, we use additional control variables to examine the effect of commodity export price shocks and ethnic and religious diversity on civil conflicts. Throughout the columns, we add the lagged controls such as population, GDP per capita, foreign aid per capita, institutional and governance indicators: institutionalized democracy, institutionalized autocracy, civil liberties, and political rights. Moreover, we use geographical controls including mountainous terrain and "noncontiguity" (i.e., whether a country has regions separated by land or water) in the Logistic Regression Model.These control variables have been widely used in the literature (see, for instance, Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Montalvo and Reynal-Querol, 2005; Blattman and Miguel, 2010; Brückner and Ciccone, 2010; Esteban et al., 2012; Nunn and Qian, 2012; Janus and Riera-Crichton, 2015).

The inclusion of any of the control variables improves the explanatory capacity of the model by raising the values of the coefficients compared to one which does not include any control variable. Most importantly, the inclusion of all these additional explanatory variables

does not change the qualitative results that we have in the baseline specification. Indeed, most of the control variables are statistically significant with the expected signs. For instance, the real GDP per capita has the expected decreasing effect on the probability of civil conflicts, as countries with higher income are less exposed to civil conflicts even in conditions of economic shocks. Likewise, out of the institutional quality variables, while democratization and protection of civil liberate decrease the probability of civil conflicts, institutional autocracy has an increasing effect. Therefore, these results show that our baseline findings are robust.

Table 1.5: Results with additional control variables

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔPS_{t-1}	0.0128	0.0143	0.01000	0.00923	-0.0267	0.195**	0.0138
	(0.0151)	(0.0148)	(0.0151)	(0.0148)	(0.0167)	(0.0970)	(0.0150)
ΔEP_{t-1}		6.016***					
		(1.148)					
$\Delta PSEP_{t-1}$		0.172***					
		(0.0422)					
ΔEF_{t-1}			3.205***				
			(0.626)				
$\Delta PSEF_{t-1}$			-0.0817**				
			(0.0359)				
ΔRP_{t-1}				2.248***			
				(0.450)			
$\Delta PSRP_{t-1}$				-0.105***			
				(0.0273)			
ΔRF_{t-1}					4.274***		
					(0.841)		

Continuation of Table1.5

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
$\Delta PSRF_{t-1}$					-0.166***		
					(0.0406)		
ΔEPf_{t-1}						-6.960***	
						(1.353)	
$\Delta PSEPf_{t-1}$						0.358*	
						(0.190)	
ΔEFf_{t-1}							2.137***
							(0.420)
$\Delta PSEFf_{t-1}$							-0.0700**
							(0.0294)
$\Delta Logpopulation_{t-1}$	-0.223*	-0.224*	-0.231*	-0.234*	-0.236*	-0.224*	-0.227*
	(0.129)	(0.129)	(0.129)	(0.129)	(0.129)	(0.129)	(0.129)
$\Delta LogGDPPercapita_{t-1}$	-0.155***	-0.155***	-0.155***	-0.154***	-0.154***	-0.156***	-0.154***
	(0.0438)	(0.0439)	(0.0438)	(0.0437)	(0.0438)	(0.0438)	(0.0438)
$\Delta LogForeignaid_{t-1}$	5.10e-05	5.44e-05	5.12e-05	6.89e-05	6.86e-05	4.88e-05	6.18e-05
	(9.35e-05)	(9.34e-05)	(9.34e-05)	(9.32e-05)	(9.31e-05)	(9.36e-05)	(9.31e-05)

Continuation of Table1.5

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
$\Delta Democracy_{t-1}$	-0.0227***	-0.0227***	-0.0226***	-0.0224***	-0.0222***	-0.0226***	-0.0224***
	(0.00363)	(0.00362)	(0.00363)	(0.00363)	(0.00362)	(0.00363)	(0.00364)
$\Delta Autocracy_{t-1}$	0.0223***	0.0222***	0.0223***	0.0220***	0.0220***	0.0223***	0.0223***
	(0.00366)	(0.00366)	(0.00365)	(0.00365)	(0.00364)	(0.00366)	(0.00366)
$\Delta PoliticalRights_{t-1}$	0.0351	0.0346	0.0337	0.0314	0.0311	0.0363	0.0330
	(0.0233)	(0.0231)	(0.0233)	(0.0231)	(0.0231)	(0.0234)	(0.0234)
$\Delta CivilLiberties_{t-1}$	-0.146***	-0.142***	-0.145***	-0.143***	-0.144***	-0.146***	-0.145***
	(0.0221)	(0.0219)	(0.0221)	(0.0220)	(0.0220)	(0.0221)	(0.0221)
Constant	2.828***	1.532**	2.715***	1.961**	3.152***	-0.549	2.464***
	(0.937)	(0.737)	(0.910)	(0.790)	(0.980)	(0.521)	(0.873)
Observations	3,361	3,361	3,361	3,361	3,361	3,361	3,361
R-squared	0.499	0.501	0.500	0.501	0.501	0.499	0.500
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Note: Liner Probability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country-specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 1.8 presents alternative measures of political instability. columns 1 to 4 report a non-binary measure of conflict intensity. Accordingly, we find a homogeneous effect of the price changes to the conflict intensity as we have in the baseline specification. The interaction term between the lagged commodity export price shocks and ethnic polarization increases the likelihood of civil conflicts, but ethnic fractionalization, religious polarization and religious fractionalization interacting with the lagged commodity export price shocks decrease the likelihood of civil conflict intensity. Once more, in columns 5 to 8 of Table 1.8 we find a similar effect of the commodity export price shocks on the probability of civil wars, as with the baseline results reported above. In general, in the case of ethnic polarization we have an increasing effect, but for ethnic fractionalization, religious polarization and fractionalization the decreasing impacts appear to be the predominant effects.

Within the developing country group, economies with higher income per capita, may be less conflict-prone in response to commodity export price shocks. Considering that countries with less income are more likely to respond to price changes, as a robustness check, we focus on a sample with low-income economies to examine how sensitive they are for economic shocks.[12] In spite of a significant drop in the sample

[12]The cut-off levels for low-income and high-income countries are taken to be as in DeJong and Ripoll (2006) and Musayev et al. (2014), where the income economies classification are as the threshold as defined by World Bank's income measures. The resulting income definition applies to the following categories: low-half income countries are those with real per capita GDP less than $5,499$ USD and the higher-half income countries are those with real per capita GDP above $5,500$

size, the results in Table 1.9 remain statistically significant. Waddell (2006) argues that the very poorest countries may be less conflict prone because their populations have less surplus to fight with and to fight over. Our estimation results, however, show that the least developed countries are more vulnerable to civil conflicts. Results from column 1 to 4 of Table 1.9, revile that commodity export price increase the likelihood of civil conflicts in the least developed countries where ethnically divers and religiously polarized.

Further, in our robustness check process, we have also test whether our findings are driven by a particular region's characteristics that might usually be deemed as conflictual. Table 1.10 reports the findings we obtain by adding three regional dummies: Africa, Asia and Latin America. The results appear unanimously significant, while keeping the signs we have in the baseline specification. This indicates that the effects of social heterogeneity and commodity export price shocks have equivalent effects on civil conflicts in all developing regions. In addition to the regional specification, we also have estimated the effect of commodity export price shocks and social diversity on political instability to conflict prone countries. Table 1.11 show that the baseline results remain robust with the conflict prone countries specification.

USD. In this study, the classifications are based on the beginning sample income rankings.

1.6 Conclusions

This chapter analyzes the joint effect of exogenous economic shocks and the pre-existence of social heterogeneity (i.e, ethnic and religious diversity) in the political instability of developing countries. We aim to find the impact of commodity net export price shocks at various levels on intrastate conflicts in the presence of ethnic and religious polarization and fractionalization, and we provide an economic interpretation for these conditions. We use a sample of 57 globally tradable commodities that exported from 89 developing countries over the period 1970-2014. The ethnic and religious diversity indices was mainly extracted from Montalvo and Reynal-Querol (2005). Meanwhile, as an alternative indicator of social fragmentation we also used the Fearon and Laitin (2003) index of ethnic polarization and fractionalization.

Our empirical findings show that the commodity prices shocks affect the likelihood of civil conflicts. Indeed, the shocks have different patterns of impact on civil conflicts depending on the nature of social diversity, types of price shocks (overall, positive or negative) and the type of the commodity.

In particular, during overall price shocks, the more ethnically polarized the society, the graver the adverse effect of price changes, and thus the higher the probability of civil conflicts. This investigation has illustrated that price shocks have an increasing impact on the likelihood of civil conflicts, where ethnic diversity is characterized by a bimodal distribution (polarization). Furthermore, this effects remains

robust specific to the positive shocks to the export commodity prices.

The commodity price shocks have a mixed effect on the probability of civil conflicts in relation to ethnic and religious fractionalization, as well as religious polarization measures of social diversity. The overall changes in the commodity export prices have a decreasing effect on the probability of civil conflicts, with these social diversity indices. In contrast a fall in export commodity prices increased violence in relation to these three indices of social diversity.

Furthermore, using desegregating data by commodity types we find out that heterogeneous outcomes on the likelihood of civil conflicts outbreak. When the capital-intensive commodities price decline, the probability of conflict decrease in ethnically fractionalized societies. Whereas the violence will increase in religiously polarized and fractionalized communities. The labour intensive commodities prices decrease also leading to similar outcomes in terms of increasing civil conflicts in religiously polarized and fractionalized societies.

It is noteworthy that in the Montalvo and Reynal-Querol (2005) measure of religious diversity, there is a high degree of correlation between religious fractionalization and polarization (0.95) which creates a problem of multicolinearity if they are used together. Even though we treat them separately, we have similar effects on the incidence of civil conflicts. This indicates that the Montalvo and Reynal-Querol (2005) religious diversity has a limitations on its own. This problem mainly emanates from the categorization of the religious groups. In

other words, they opt for merging all Christians into one group when computing religious polarization in some African countries. This turns out to be a problem of equidistant: the distance between Protestants and Muslims in these countries is much larger than between Protestants and Catholics. But this is not the case in Northern Ireland. Another case is that Sunnis and Shi'as are both Muslim groups. Moreover, the violence of the opposition between the two branches of Islam has not been the same through time. Hence, this flaw indicates the need to have alternative religious polarization and fractionalization indexes which address these shortcomings.

Finally, note that our findings have significant policy implications. A better understanding of the transmission channels through which unpleasant commodity price shocks affect civil conflicts is essential for adopting policy measures to prevent destructive civil wars in developing countries. Policy makers may need to focus on building national economy resilience in order to address any adverse impacts of shocks to commodity prices. In addition, enhancing state capacity and improving institutional qualities will enable countries to prevent the threat of violent conflicts and wars which follow from fluctuating income. Furthermore, social heterogeneity affects the political stability of the countries. The results shows that ethnic polarization has positive effects on increasing the probability of civil conflicts. Adopting policy frameworks that promote economic equality, social justice and cultural integrity between social groups may help to establish mutual understanding which results in harmony, peace and sustainable security.

1.7 Appendix

1.7.1 Definitions of variables

Next, we provide definitions of all variables used throughout the chapter.

1. Major variables

   (a) Different measures of Conflict

      i. UCDP/PRIO Armed Conflict Dataset defined "armed conflict" as a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths. In this study we consider incidences, new conflicts in a year, and intensity from UCDP Monadic Conflict Onset and Incidence Dataset.

      ii. Incid. Incidence of intrastate conflict. The UCDP dataset coded 1 in all country-years with at least one active conflict/conflict-dyad (a dyad consists of two conflicting primary parties and at least one of the primary parties must be the government of a state).

      iii. Intensity . The UCDP dataset defines the intensity level of conflicts in a country-year bases. Two different intensity levels are coded. 1: minor armed conflict/conflict-

dyad, which result in at list 25 deaths; and 2: as war for battle-related deaths of at least 1,000 per year per incompatibility.

Armed Conflict and Intervention (ACI) Datasets organize "Major Episodes of Political Violence" data of conflicts. Major episodes of political violence are defined by the systematic and sustained use of lethal violence by organized groups that results in at least 500 directly related deaths over the course of the episode. Episodes are coded for time span and magnitude and are assigned to one of seven categories of armed conflict. We consider only civil war (CIVWAR). The dataset designated each episode that spans a certain number of years ("inclusive years") and is judged to have been of a certain, general "magnitude of societal-systemic impact". The conflict episodes range from 0 (no violence) to 10 (war). The magnitude scores are considered consistent and comparable across categories and cases, that is, approximating a ratio scale. We give a value equal to 1 for all levels of violence war, 0 otherwise.

(b) Main distributional measures

i. ETHFRAC and RELFRAC. Index of ethnic and religious fractionalization, respectively, which measure the

probability that two randomly selected individuals in a country will belong to different ethnic or religious groups.

The is index defined as:
$FRAC = \sum_{i=1}^{N} n_i(1 - n_i) = 1 - \sum_{i=1}^{N} n_i^2$,
Where Π_i is the proportion of people who follow religion i or belong to ethnic group i.

ii. ETHPOL and RELPOL. Ethnic and religious polarization indexes that measure the normalized distance of a particular distribution of ethnic and religious groups, respectively, from a bimodal distribution. Data for both ethnic and religious polarization and fractionalization indexes are obtained from Montalvo and Reynal-Querol (2005).

MRQ defined both ETHPOL and RELPOL as:

$$RQ = 1 - \sum_{i=1}^{N} (\frac{0.5 - \pi_i}{0.5})^2 \pi_i = 4 \sum_{i=1} \sum_{i \neq j}^{N} \pi^2 i \pi_j$$

Alternatively, we used Fearon and Laitin (2003) groupings of ethnic farctionalization and polarization indexes. However, we use $\delta = 0.05$, as defined by Esteban et al. (2012).

EFf. Ethnic fractionalization, which is defined as $F = \sum_{i=1}^{N} n_i(1 - n_i)$, where n_i is the population share of group i and m is the number of groups.

EPf. Ethnic polarization computed by Esteban et al. (2012) as $\sum_{i=1}^{m}\sum_{j=1}^{m} n_{i_2} n_j k_{ij}$ where $k_{ij} = 1 - s_{ij}^{0.05}$ and s_{ij}, are degree of similarity between two languages i and j, given by the ratio of the number of common branches to the maximum possible number (15 for the entire tree) Esteban et al. (2012).

2. Main control Variables

   (a) Governance and Institutional variables

      i. AUTOCR. Institutionalized Autocracy. The data source of of this variable is Polity IV dataset version 2013. In Polity IV dataset autocracy takes values 0-10 scale, with 10 signifying extreme autocracy.

      ii. CVLIB. Civil liberty (lack of liberty). The data source of this variable is Freedom House (2016), which considers a 1-7 scale (7 indicates the lowest level of liberties).

      iii. DEMOC. Institutionalized Democracy. The data source of of this variable is Polity IV dataset version 2013. In Polity IV dataset democracy ranges from 0 (the lowest) to 10 (the highest) scale.

      iv. CVLIB. Civil liberty (i.e., lack of liberty). The data source of this variable is Freedom House (2016), which consider a 1-7 scale (7 indicates the lowest level of liberties).

v. POLRIGHTS. (i.e., Lack of) political rights. The data source is Freedom House (2016), which considers a $1-7$ scale (1 indicates most free).

(b) Other control variables

i. FAID. Foreign Aid Per capita for each year. Source: World Bank Database.

ii. GDPPC. Log of real GDP per capita corresponding to each year. Data source is the World Bank Database(2016).

iii. MOUNT.% mountainous terrain. The data sources is Fearon and Laitin (2003), who use the codings of geographer A.J. Gerard.

iv. NCONT. Noncontiguous states, referring to countries with territory holding at least 10,000 people and separated from the land area containing the capital city either by land or by 100 kilometers of water. Source: Fearon and Laitin (2003).

v. POP: Log of population each year. Source: the World Bank Database (2016).

1.7.2 Data details and results of estimations

Table 1.6: List of commodities

Code	Commodity	Code	Commodity	Code	Commodity
1	Aluminium	23	Lead	45	Silver
2	Asbestos	24	Linseed oil	46	Sisal
3	Bananas	25	Live cattle	47	Soybean oil
4	Barley	26	Live poultry	48	Soybeans
5	Beef	27	Live sheep	49	Sorghum
6	Cashews	28	Live swine	50	Sugar
7	Coal	29	Lumber	51	Sunflower Oil
8	Cocoa	30	Maize	52	Swine
9	Coconut copra oil	31	Manganese	53	Tea
10	Coffee	32	Natural gas	54	Tin
11	Copper	33	Nickel	55	Tobacco
12	Copra	34	Olive oil	56	Wheat
13	Cotton	35	Oranges	57	Wool
14	Diamond	36	Palm oil	58	Zinc
15	Fish	37	Pepper		
16	Fishmeal	38	Petroleum		
17	Gold	39	Phosphates		
18	Groundnut	40	Poultry		
19	Groundnut oil	41	Pulp		
20	Hides	42	Rice		
21	Iron ore	43	Rubber		
22	Jute	44	Shrimp		

Table 1.7: List of countries

Code	Country	Code	Country	Code	Country
1	Afghanistan	31	Gabon	61	Panama
2	Algeria	32	Gambia	62	Papua New Guinea
3	Angola	33	Ghana	63	Paraguay
4	Argentina	34	Guatemala	64	Peru
5	Bahamas, The	35	Guinea	65	Philippines
6	Bahrain	36	Guyana	66	Rwanda
7	Bangladesh	37	Haiti	67	Saudi Arabia
8	Barbados	38	Honduras	68	Senegal
9	Benin	39	India	69	Sierra Leone
10	Bolivia	40	Indonesia	70	Singapore
11	Botswana	41	Jamaica	71	Solomon Islands
12	Brazil	42	Jordan	72	Somalia
13	Burundi	43	Kenya	73	South Africa
14	Cameroon	44	Kuwait	74	Sri Lanka
15	Central African Republic	45	Liberia	75	Syrian Arab Republic
16	Chad	46	Madagascar	76	Sudan
17	China	47	Malaysia	77	Tanzania
18	Colombia	48	Malawi	78	Thailand
19	Comoros	49	Mali	79	Togo
20	Congo, Republic.	50	Malta	80	Trinidad and Tobago
21	Costa Rica	51	Mauritania	81	Tunisia
22	Cte d'Ivoire	52	Mauritius	82	Turkey
23	Cyprus	53	Morocco	83	Uganda
24	Democratic Republic of the Congo	54	Mozambique	84	United Arab Emirates
25	Dominican Republic	55	Nepal	85	Uruguay
26	Ecuador	56	Nicaragua	86	Venezuela, RB
27	Egypt	57	Niger	87	Yemen, Republic
28	El Salvador	58	Nigeria	88	Zambia
29	Ethiopia	59	Oman	89	Zimbabwe
30	Fiji	60	Pakistan		

Table 1.8: Results of Conflict Intensity and Civil war

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	C.intensity	C.intensity	C.intensity	C.intensity	Civil war	Civil war	Civil war	Civil war
ΔPS_{t-1}	0.0391	0.0223	-0.0245	-0.232	0.0240	0.0221	0.0215	
	(0.139)	(0.144)	(0.145)	(0.197)	(0.0149)	(0.0154)	(0.0150)	
ΔEP_{t-1}	78.31**				10.96***			
	(39.58)				(1.354)			
$\Delta PSEP_{t-1}$	1.602***				0.115***			
	(0.408)				(0.0389)			
ΔEF_{t-1}		21.94*				5.898***		
		(11.70)				(0.737)		
$\Delta PSEF_{t-1}$		-0.828***				-0.0597		
		(0.315)				(0.0384)		
ΔRP_{t-1}			11.62*				4.200***	
			(6.274)				(0.530)	
$\Delta PSRP_{t-1}$			-0.641**				-0.0669**	
			(0.261)				(0.0320)	
ΔRF_{t-1}				21.54*				7.895***

Continuation of Table 1.8

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	C.intensity	C.intensity	C.intensity	C.intensity	Civil war	Civil war	Civil war	Civil war
				(11.46)				(0.991)
$\Delta PSRF_{t-1}$				-0.933**				-0.0815*
				(0.442)				(0.0449)
$\Delta Logpopulation_{t-1}$	-4.548***	-4.359**	-4.416**	-4.442**	-0.372**	-0.370**	-0.371**	-0.371**
	(1.764)	(1.758)	(1.761)	(1.760)	(0.148)	(0.148)	(0.148)	(0.148)
$\Delta LogGDPPercapita_{t-1}$	-0.604	-0.598	-0.588	-0.596	-0.317***	-0.316***	-0.315***	-0.316***
	(0.419)	(0.416)	(0.415)	(0.415)	(0.0440)	(0.0438)	(0.0437)	(0.0438)
$\Delta LogForeignaid_{t-1}$	-0.00221	-0.00209	-0.00209	-0.00207	-0.000222**	-0.000225**	-0.000213*	-0.000216*
	(0.00266)	(0.00260)	(0.00261)	(0.00261)	(0.000111)	(0.000111)	(0.000111)	(0.000111)
$\Delta Democracy_{t-1}$	-0.130***	-0.122***	-0.124***	-0.123***	-0.0135***	-0.0135***	-0.0134***	-0.0134***
	(0.0339)	(0.0339)	(0.0339)	(0.0339)	(0.00281)	(0.00281)	(0.00282)	(0.00281)
$\Delta Autocracy_{t-1}$	0.0935***	0.0929***	0.0929***	0.0928***	0.0176***	0.0177***	0.0175***	0.0175***
	(0.0336)	(0.0335)	(0.0333)	(0.0333)	(0.00363)	(0.00363)	(0.00364)	(0.00363)
$\Delta PoliticalRights_{t-1}$	0.248	0.256	0.250	0.247	-0.00271	-0.00239	-0.00355	-0.00317
	(0.207)	(0.213)	(0.209)	(0.210)	(0.0208)	(0.0209)	(0.0208)	(0.0208)
$\Delta CivilLiberties_{t-1}$	-1.001***	-1.090***	-1.060***	-1.064***	-0.0842***	-0.0862***	-0.0850***	-0.0854***
	(0.195)	(0.194)	(0.194)	(0.193)	(0.0214)	(0.0215)	(0.0214)	(0.0214)
$\Delta Mountains_{t-1}$	-0.00971	0.0721***	0.0952***	0.0975***				
	(0.0540)	(0.0155)	(0.0121)	(0.0123)				

Continuation of Table 1.8

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	C.intensity	C.intensity	C.intensity	C.intensity	Civil war	Civil war	Civil war	Civil war
$\Delta Noncontinuous_{t-1}$	23.86**	-0.352	15.00***	14.66***				
	(10.02)	(2.664)	(5.771)	(5.532)				
Constant cut1	-18.63**	-28.88**	-24.02**	-30.13**				
	(8.158)	(12.42)	(10.19)	(12.74)				
Constant cut2	-16.39**	-26.64**	-21.78**	-27.89**				
	(8.143)	(12.41)	(10.18)	(12.73)				
Constant					2.247***	4.483***	3.067***	5.251***
					(0.833)	(1.038)	(0.903)	(1.116)
Observations	3,361	3,361	3,361	3,361	3,288	3,288	3,288	3,288
R-squared					0.506	0.506	0.506	0.506
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: columns 1-4 ordered logit; columns 5-6 Liner Probability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country-specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 1.9: Results to low income economies

Column	(1)	(2)	(3)	(4)	(5)
Variables	Conflict Incid	Conflict Incid	Conflict Incid	Conflict Incid	Conflict Incid
ΔPS_{t-1}	0.0540***	0.0514***	0.0453***	0.0421***	-0.00271
	(0.0159)	(0.0155)	(0.0165)	(0.0156)	(0.0186)
ΔEP_{t-1}		7.114***			
		(1.323)			
$\Delta PSEP_{t-1}$		0.140***			
		(0.0394)			
ΔEF_{t-1}			3.816***		
			(0.720)		
$\Delta PSEF_{t-1}$			-0.0910**		
			(0.0383)		
ΔRP_{t-1}				2.641***	
				(0.518)	
$\Delta PSRP_{t-1}$				-0.118***	
				(0.0280)	
ΔRF_{t-1}					5.011***
					(0.967)
$\Delta PSEF_{t-1}$					-0.198***
					(0.0420)
$\Delta Logpopulation_{t-1}$	-0.122	-0.123	-0.128	-0.127	-0.129
	(0.133)	(0.133)	(0.133)	(0.133)	(0.133)
$\Delta LogGDPPercapita_{t-1}$	-0.138***	-0.137***	-0.137***	-0.135***	-0.136***
	(0.0528)	(0.0528)	(0.0527)	(0.0525)	(0.0525)

Continuation of Table 1.9

Column	(1)	(2)	(3)	(4)	(5)
Variables	Conflict Incid	Conflict Incid	Conflict Incid	Conflict Incid	Conflict Incid
$\Delta LogForeignaid_{t-1}$	-1.97e-05	-1.73e-05	-1.81e-05	4.94e-06	3.69e-06
	(9.64e-05)	(9.60e-05)	(9.63e-05)	(9.59e-05)	(9.57e-05)
$\Delta Democracy_{t-1}$	-0.0204***	-0.0204***	-0.0203***	-0.0202***	-0.0200***
	(0.00398)	(0.00397)	(0.00397)	(0.00398)	(0.00397)
$\Delta Autocracy_{t-1}$	0.0293***	0.0292***	0.0294***	0.0290***	0.0290***
	(0.00451)	(0.00451)	(0.00450)	(0.00449)	(0.00448)
$\Delta PoliticalRights_{t-1}$	0.0418*	0.0409*	0.0406*	0.0375	0.0370
	(0.0244)	(0.0242)	(0.0244)	(0.0241)	(0.0241)
$\Delta CivilLiberties_{t-1}$	-0.173***	-0.170***	-0.172***	-0.170***	-0.170***
	(0.0236)	(0.0234)	(0.0235)	(0.0233)	(0.0233)
Constant	2.439**	0.789	2.271**	1.354	2.748***
	(1.000)	(0.754)	(0.969)	(0.827)	(1.049)
Observations	2,572	2,572	2,572	2,572	2,572
R-squared	0.530	0.532	0.531	0.533	0.534
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Note: Liner Probability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country-specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 1.10: Results with Regional Dummies

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	
ΔPS_{t-1}	0.0128	0.0143	0.01000	0.00923	-0.0267	0.195**	0.0138
	(0.0151)	(0.0148)	(0.0151)	(0.0148)	(0.0167)	(0.0970)	(0.0150)
ΔEP_{t-1}		8.318***					
		(0.862)					
$\Delta PSEP_{t-1}$		0.172***					
		(0.0422)					
ΔEF_{t-1}			10.34***				
			(1.100)				
$\Delta PSEF_{t-1}$			-0.0817**				
			(0.0359)				
ΔRP_{t-1}				-0.165			
				(0.432)			
$\Delta PSRP_{t-1}$				-0.105***			
				(0.0273)			
ΔRF_{t-1}					-141.7***		
					(15.18)		
$\Delta PSEF_{t-1}$					-0.166***		
					(0.0406)		
ΔEPf_{t-1}						15.02***	
						(1.579)	
$\Delta PSEPf_{t-1}$						0.358*	
						(0.190)	

Continuation of Table 1.10

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	
ΔEPf_{t-1}							3.447***
							(0.369)
$\Delta PSEFf_{t-1}$							-0.0700**
							(0.0294)
$\Delta Logpopulation_{t-1}$	-0.223*	-0.224*	-0.231*	-0.234*	-0.236*	-0.224*	-0.227*
	(0.129)	(0.129)	(0.129)	(0.129)	(0.129)	(0.129)	(0.129)
$\Delta LogGDPPercapita_{t-1}$	-0.155***	-0.155***	-0.155***	-0.154***	-0.154***	-0.156***	-0.154***
	(0.0438)	(0.0439)	(0.0438)	(0.0437)	(0.0438)	(0.0438)	(0.0438)
$\Delta LogForeignaid_{t-1}$	5.10e-05	5.44e-05	5.12e-05	6.89e-05	6.86e-05	4.88e-05	6.18e-05
	(9.35e-05)	(9.34e-05)	(9.34e-05)	(9.32e-05)	(9.31e-05)	(9.36e-05)	(9.31e-05)
$\Delta Democracy_{t-1}$	-0.0227***	-0.0227***	-0.0226***	-0.0224***	-0.0222***	-0.0226***	-0.0224***
	(0.00363)	(0.00362)	(0.00363)	(0.00363)	(0.00362)	(0.00363)	(0.00364)
$\Delta Autocracy_{t-1}$	0.0223***	0.0222***	0.0223***	0.0220***	0.0220***	0.0223***	0.0223***
	(0.00366)	(0.00366)	(0.00365)	(0.00365)	(0.00364)	(0.00366)	(0.00366)
$\Delta PoliticalRights_{t-1}$	0.0351	0.0346	0.0337	0.0314	0.0311	0.0363	0.0330
	(0.0233)	(0.0231)	(0.0233)	(0.0231)	(0.0231)	(0.0234)	(0.0234)
$\Delta CivilLiberties_{t-1}$	-0.146***	-0.142***	-0.145***	-0.143***	-0.144***	-0.146***	-0.145***
	(0.0221)	(0.0219)	(0.0221)	(0.0220)	(0.0220)	(0.0221)	(0.0221)
Africa	0.119	0.219***	0.768***	0.102**	-44.36***	-1.045***	1.434***
	(0.0840)	(0.0837)	(0.106)	(0.0491)	(4.775)	(0.152)	(0.158)
Asia	0.897***	-0.0889	-0.988***	0.927***	-17.65***	1.461***	0.955***
	(0.0999)	(0.113)	(0.186)	(0.0673)	(1.953)	(0.135)	(0.102)
L_America	0.177***	2.150***	1.849***	0.111	-75.87***	1.645***	2.461***
	(0.0376)	(0.213)	(0.184)	(0.247)	(8.151)	(0.164)	(0.247)

Continuation of Table 1.10

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	
Constant	1.931**	1.112	3.332***	2.015**	12.19***	8.695***	1.272
	(0.887)	(0.884)	(0.912)	(0.821)	(1.473)	(1.189)	(0.882)
Observations	3,361	3,361	3,361	3,361	3,361	3,361	3,361
R-squared	0.499	0.501	0.500	0.501	0.501	0.499	0.500
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Note: Liner Probability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country-specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 1.11: The effect of ethnic and religious heterogeneity and price Shocks on conflict: To conflict-prone countries

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔPS_{t-1}	0.0156	0.0205	0.0136	0.00698	-0.0337	0.354**	0.0175
	(0.0189)	(0.0184)	(0.0188)	(0.0186)	(0.0214)	(0.157)	(0.0188)
ΔEP_{t-1}		8.354***					
		(0.934)					
$\Delta PSEP_{t-1}$		0.222***					
		(0.0524)					
ΔEF_{t-1}			10.31***				
			(1.188)				
$\Delta PSEF_{t-1}$			-0.0871**				
			(0.0401)				
ΔRP_{t-1}				-39.08***			
				(5.035)			
$\Delta PSRP_{t-1}$				-0.126***			
				(0.0335)			

Continuation of Table 1.11

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
ΔRF_{t-1}					-141.3***		
					(16.39)		
$\Delta PSRF_{t-1}$					-0.194***		
					(0.0479)		
ΔEPf_{t-1}						15.06***	
						(1.708)	
$\Delta PSEPf_{t-1}$						0.658**	
						(0.304)	
ΔEFf_{t-1}							3.435***
							(0.398)
$\Delta PSEFf_{t-1}$							-0.0891**
							(0.0358)
$\Delta Logpopulation_{t-1}$	-0.280	-0.269	-0.288	-0.310	-0.312	-0.276	-0.289
	(0.209)	(0.210)	(0.209)	(0.210)	(0.210)	(0.209)	(0.209)
$\Delta LogGDPPercapita_{t-1}$	-0.182***	-0.178***	-0.182***	-0.182***	-0.183***	-0.184***	-0.180***
	(0.0546)	(0.0547)	(0.0545)	(0.0545)	(0.0545)	(0.0546)	(0.0546)

Continuation of Table 1.11

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid	C.Incid
$\Delta LogForeignaid_{t-1}$	8.40e-05	0.000100	0.000106	0.000129	0.000136	8.98e-05	0.000113
	(0.000260)	(0.000259)	(0.000260)	(0.000259)	(0.000259)	(0.000260)	(0.000259)
$\Delta Democracy_{t-1}$	-0.0268***	-0.0273***	-0.0264***	-0.0260***	-0.0258***	-0.0267***	-0.0263***
	(0.00474)	(0.00473)	(0.00475)	(0.00475)	(0.00474)	(0.00473)	(0.00476)
$\Delta Autocracy_{t-1}$	0.0261***	0.0261***	0.0262***	0.0259***	0.0259***	0.0261***	0.0263***
	(0.00455)	(0.00455)	(0.00454)	(0.00453)	(0.00453)	(0.00455)	(0.00454)
$\Delta PoliticalRights_{t-1}$	0.0381	0.0367	0.0352	0.0319	0.0315	0.0398	0.0349
	(0.0301)	(0.0298)	(0.0302)	(0.0299)	(0.0299)	(0.0301)	(0.0302)
$\Delta CivilLiberties_{t-1}$	-0.166***	-0.159***	-0.166***	-0.165***	-0.165***	-0.166***	-0.167***
	(0.0272)	(0.0270)	(0.0272)	(0.0270)	(0.0270)	(0.0272)	(0.0272)
Constant	3.284**	1.380	2.797*	19.36***	-4.853***	10.60***	2.715*
	(1.503)	(1.461)	(1.487)	(2.719)	(1.543)	(1.914)	(1.483)
Observations	2,543	2,543	2,543	2,543	2,543	2,543	2,543
R-squared	0.448	0.451	0.448	0.450	0.450	0.449	0.449
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Note: Linear Portability Model estimates with robust standard errors clustered by country in parentheses. All regressions include country and year fixed effects, and country specific time trends. Notation: *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Chapter 2

Trends in African Migration to Europe: Drivers Beyond Economic Motivations

Overview. The current migration and refugee crisis in Europe requires an understanding of a range of different migration drivers beyond the well-known economic determinants. In this chapter, we view migration from a broader human security perspective and analyze the determinants of regular and asylum seeker migration flows from Africa to Europe for the period 1990–2014. Our results show that, in addition to economic determinants, a combination of push and pull factors influences migration decisions by individuals. In particular, rising political persecution, ethnic cleansing, human rights violations, political instability and civil conflicts in African source countries are all significantly associated with increased migration flows into European destination

countries. Therefore, our results underscore the need for the EU and European countries to collaborate with the source countries, not only in terms of supporting economic development in the source countries, but also in promoting human security: human rights, democracy, peace and social stability.

Keywords: international migration, asylum seeker, refugee crisis, human security, Poisson Pseudo-Maximum Likelihood.

2.1 Introduction

Migration and the refugee crisis are high on the policy agendas of European countries, in relation to economic, security and social issues. In the current wave of migration, Europe is witnessing a mixed-migration phenomenon where a large number of economic migrants are joining asylum seekers in their journey to reach the European continent (Bertoli et al., 2013; Park, 2015). Each year hundreds of thousands of immigrants flow into Europe mainly from Africa, the Middle East, and South Asia.[1] With such significant levels of migration inflow, European countries are said to have reached a breaking point in their ability to meet the European Union (EU) standards for receiving immigrants and facilitating asylum applications (Banulescu-Bogdan and Fratzke,

[1] According to the United Nations High Commissioner for Refugees United Nations (2015b), more than 1,015,078 migrants and refugees arrived in Europe by crossing the Mediterranean in the year 2015 and 362,753 in the year 2016. Retrieved from: `http://data2.unhcr.org/en/situations/mediterranean`.

2015). Furthermore, this influx has imposed internal 'political fatigue', with nationalist parties gaining momentum in many EU member states and with security tensions rising due to terrorist-linked incidents in some countries (Park, 2015). On the other hand, thousands of people perish every year while attempting to cross the Mediterranean Sea (Telschow, 2014). These events have created mounting pressure on European governments, particularly from groups championing human rights, to work and spend more on rescue missions and to facilitate to entry for more immigrants. As a result, migration has now becomea prominent feature in the economic, social, and political landscape of European countries (Kerr and Kerr, 2011).

In response to these tense situations, European governments are actively working to cut the flows of migrants and asylum seekers across the Mediterranean in partnership with African governments (García Andrade and Martín, 2015). Important initiatives in this regard include the EU-Africa Declaration on Migration and Mobility (2014), in which European and African governments pledged to combat human trafficking,and to facilitate the return and readmission of migrants whose asylum applications have been refused.[2] The declaration also emphasized the importance of addressing the root causes of irregular migration, including by providing employment opportunities for the youth at regional level. In the same year, the so-called "Khartoum Process" and "Rabat Process" were established with a special focus on preventing

[2]https://au.int/sites/default/files/pages/32899-file−5._the_eu_africa_declaration_on_migration_and_mobilty_2014.pdf.

and fighting migrant smuggling and human trafficking in the Horn of Africa and Central, Western and Northern Africa, respectively. The Valletta Summit in November 2015 brought by far the largest number of African and European heads of states and governments and concluded with the EU setting up an Emergency Trust Fund to promote development in Africa, in return for African countries helping European countries in the crisis.[3] In June 2016, the EU established a wide-ranging Migration Partnership Framework (MPF), which aims to coordinate collaborations with African and other third country governments (European Commission, 2016).

These intensified cooperation between the EU and African governments, including those that are authoritarian and which are accused of severe human rights violations and political persecution, has caused significant controversy. For instance, critics argue that by basing development aid and foreign relations on countries agreement to cooperate with EU migration control objectives, the EU is making a significant policy change away from putting human rights as a central point of EU foreign policy (Castillejo, 2017; Oette and Babiker, 2017; Human Rights Watch, 2018). The Human Rights Watch (2018) further argues that this shift of policy could bolster the very security forces that violate human rights and eventually fail to address the human rights abuses, which the Human Rights Watch believes are often the causes of forced migration.

[3]http://www.consilium.europa.eu/en/meetings/international−summit/2015/11/11-12/.

A number of factors might be behind the EU's apparent policy shift away from its long-held policy of defending human rights in Africa towards stronger border control and quicker returns of 'illegal' migrants. Obviously one can argue that the large number of migrant flows might have forced the EU to prioritize the short-term objective of reducing the number of immigrants above its principle of defending human rights. What is rather more visible from its publications is the apparent stance taken by the EU that economic motives, rather than human rights violations, are the principal reasons for migration from Africa to Europe. In fact, it is explicitly stated in the 'Migration Compact'—an important contribution to the MPF document by the Italian government—that while migrant flows through the Eastern Mediterranean route include both refugees and economic migrants, 'flows through the Central/Western Mediterranean route are composed mainly by economic migrants' (Italian Government, 2016, p.1). The MPF document also contains several phrases which implicitly endorse this belief by the Italian government.[4]

Despite the seemingly divergent views held by European governments and human rights groups on the role of human security factors in the recent migration flows from Africa to Europe, there is surpris-

[4]**For instance, in discussing the importance of promoting investment in African economies as a key long-term solution to address the root causes of migration to Europe, the MPF states that 'instead of letting irregular migrants risk their lives trying *to reach European labour markets*, European private and public resources should be mobilised for investment in third countries of origin.'(European Commission, 2016, p.11, emphasis ours).**

ingly little empirical evidence to substantiate either of these stances. While a few extant studies have examined determinants of African migration flows, they have however either focused exclusively on intra-African migration flows or studied international migration from Africa together with intra-African flows. For instance, investigating trends of migration flows in sub-Saharian African (SSA) countries for the period 1965–2005, Naudé (2010) finds that armed conflict and lack of job opportunities are the most important determinants. However, he employs net migration flows data, which are obtained as the difference between emigration and immigration per 1,000 inhabitants. Consequently, Naudé (2010) does not examine determinants of bilateral migration flows from a given sending African country to specific host countries. Moreover, the net migration data include intra-African migration, which is the most prevalent form of African migration (Lucas, 2015). As a result, it is unclear to what extent his findings could be used to explain trends in migration flows from Africa to Europe. Similarly, Ruyssen and Rayp (2014) examine intra-regional migration in SSA during the period 1980–2000. However, they do not consider migration flows from Africa to Europe. Lucas (2015) provides an extensive literature survey and empirical study on the causes, patterns and consequences of migration in Africa. In particular, by estimating a gravity model of African migration flows to 220 states and territories worldwide (including African states), he finds that violent conflicts, but not the level of democratization, are important drivers of African migration flows. Nonetheless, as an overwhelming majority of African

refugees flee to another country in Africa, his results might be dominated by intra-African migration trends.

The present study aims to fill the aforementioned gap in the literature by providing a thorough empirical examination of the role played by human security factors in explaining trends in African migration to Europe during the period 1990–2014. We consider the most basic level of human security, including freedom from fear (threats to the safety of people), freedom from want (threats to basic needs), and freedom to live in dignity (threats to human rights and by extension access to services and opportunities) (see, for instance, Anand, 1994; Gómez and Gasper, 2013). We thus consider potential factors that provoke migration and displacement, including wars, civil conflict, economic deprivation, violation of human rights and oppressive regimes (Erdemir et al., 2008; Shrestha, 2017).[5]

For our empirical investigation, we construct a new panel dataset on bilateral migration flows for a large number of destination (21 European) and source (51 African) countries for the period 1990–2014. While the choice of the period 1990–2014 is dictated by data availability, it is also a relevant period for the current migration crises in Europe, since European countries have experienced a dramatic increase in the flow of African migrants in this period and African migrants have

[5]Considering the Central American chilled migration tends, Clemens (2017) show the causal relationship between violence and international emigration. Accordingly, connecting to migration experience and the presence of social networks, violence can cause waves of migration that snowball over time, continuing to rise even when violence levels do not (Clemens, 2017).

started to become a visible part of the migrant stock in Europe.

Besides the trends in the regular migration flows from Africa to Europe, this paper studies the bilateral migration trends by additionally considering the flow of asylum seekers. It is noteworthy that this approach is typically important in the study of non-economic determinants of migration and for dealing with African forced-migration trends that occur in the absence of human security. In this regard, the existing empirical literature on bilateral migration largely focuses on regular migration trends, either the flow of labor migrants or migrant stocks, by excluding refugees and asylum seekers (e.g., Ortega and Peri, 2009; Mayda, 2010; Fitzgerald et al., 2014). However, given that the rising number of asylum seekers is at the heart of the recent refugee crisis in Europe, it is important to examine to what extent human security factors drive the flow of African asylum seekers to Europe.

To examine the determinants of bilateral migration flows from Africa to Europe, we estimate a gravity model that is similar to the model of Ortega and Peri (2013). Since the seminal work of Tinbergen (1962), the ordinary least squares (OLS) estimator has been widely used to estimate various versions of the gravity model, both in the trade literature and in migration studies. A well-known drawback of the OLS approach, however, is related to the fact that migration flows between pairs of countries may be zero in a substantial percentage of observations, and omitting those zero observations biases the regression results (Yotov et al., 2016). We address this methodological challenge in es-

timating gravity models by using the Poisson Pseudo-Maximum Likelihood (PPML) estimator, which is particularly suitable in regressions where the dependent variable has a significant proportion of zeroes (Beine and Parsons, 2015).

Our results show that broader human security factors are significant determinants of the 'South-North' migration flows. In accordance with the existing literature, income gaps between African and European countries remain a strong determinant of migration flows. However, income gaps are not the only important reason for the rise in the migrant flows to Europe: broader human security factors in Africa are equally important determinants of both regular and asylum seeker migration trends. Indeed, we find that poverty, violent civil conflicts, political persecution, human rights abuses and ethnic tensions have a substantial influence on migration across our entire set of specifications. Similar results are also obtained when we consider the flow of asylum seekers as an alternative dependent variable. Our results are robust to using alternative model specifications, to excluding North African countries, and to employing OLS instead of the PPML estimator.

The rest of the chapter is organized as follows. Section 2.2 introduces the empirical specification of our model. Section 2.3 describes our data in detail. Section 2.4 provides the results and Section 2.5 offers a conclusion. Finally, Section 2.6 presents supplementary material in the Appendices.

2.2 Empirical Model Specification

Since the seminal work of Tinbergen (1962), the gravity model of trade has been widely used to study the effects of trade policies on dyadic trade flows (see Anderson, 2011 for a review of theoretical foundations). This model specifies international trade as a positive function of the attractive "mass" of two economies and a negative function of the distance between them. The migration literature has vastly implemented the gravity model (e.g., Lewer and Van den Berg, 2008; Mayda, 2010; Beine and Parsons, 2015; and Figueiredo et al., 2016). Beine et al. (2016) summarize this strand of literature and provide a practical guide on the empirical implementation of the gravity model in migration studies.

The current study closely follows the gravity model developed in Ortega and Peri (2013). Accordingly, taking as a starting point the random utility maximization (RUM) theoretical models developed by Beine et al. (2011), Grogger and Hanson (2011) and Ortega and Peri (2013), in which income maximization problems or wage differentials are a driving force to make a migration decision, we emphasize the broader human security conditions. Specifically, we analyze a number of political and socio-cultural factors that may influence the individual's decision to move from his/her current location. Furthermore, similar to Ortega and Peri (2013) and Beine et al. (2016), our empirical model specification considers multiple destinations.

Formally, out of the set of N global countries, the individual i from

his/her source country $s \in S = s_1, s_2.....s_n$, where $S \subseteq N$, makes a decision of whether to stay in his/her source country s or to migrate to the destination country $d \in D = d_1, d_2...d_n$, where $D \subseteq N$. It is noteworthy that, as indicated in, among others, Kennan and Walker (2013), individuals are assumed to have rational expectations. Thus, they make an informed decision to migrate in seeking their maximum utility.[6] Therefore, following Ortega and Peri (2013), we assume the following utility function:

$$V_{sdt} = \alpha_s + \alpha_d + \alpha_{dt} + \beta_1 W_{sdt} + \beta_2 F_{sdt} + \beta_3 X_{sdt} + \theta Z_{sdt}, \qquad (2.1)$$

where, V_{sdt} represents the utility in country d for individuals from country s and it captures not only the average earnings, but also the average security of individual i by leaving for destination country d. Moreover, α_s and α_d are time-invariant source-specific push factors fixed effects and time-invariant destination-specific pull factors fixed effects, respectively. In addition, α_{dt} denotes destination-country fixed effects and it varies over time and across countries. Hence, the fixed effects capture the role of amenities, destination-specific cost heterogeneity as well as variables that may change through time (essentially immigration policy, culture and attitudes towards immigrant community) and affect the choices made by the immigrants. Although our primary focus is on human security factors at the source, in some specifications we also consider particular pulling factors.

[6]For the sake of further discussion, Subsection 2.6.1 presents the theoretical background of the migration model.

In (2.1) a vector W_{sdt} represents the value of expected earnings in the source country s and the destination country d in year t. In this case, the income differential is measured using per capita GDP of countries s and d. The vector F_{sdt} represents levels of freedom (free from all forms of violence or political persecution) in the source country s and the destination country d that vary over time t. To estimate the effect of freedom on migration decision, we consider a number of proxy variables, which include political stability (internal and external conflicts), institutional quality (government stability, law and order, control of corruption and bureaucratic quality), ethnic and religious tensions (fractionalization and polarization), democracy, autocracy, political rights and civil liberties of the source countries. In particular, we follow Baudassé et al. (2018) to frame the role of political institutions on migration flows using the exit and voice dichotomy of Hirschman (1970). Accordingly, if people have the freedom to express their dissatisfaction through the existing institutional frameworks, they choose the voice option and prefer to stay at home. Whereas, violations of basic rights due to poor quality of institutions leads them to choose the exit option and leave their country. The vector X_{sdt} represents other control variables, notably, socioeconomic factors such as urbanization and socioeconomic conditions. The vector Z_{sdt} stands for country-pair overall migration costs that affect migration decisions. These factors include time-varying factors, such as migrant networks, and time-invariant variables such as geographic distance, common language, common legislation and colonial legacy.

Considering separability in migration costs and including an error term in (2.1), we estimate the following estimable model of the flow of regular immigrants (M_{sdt}) from the source country s to the destination country d at time t:

$$ln(M_{sdt}) = \beta_1 ln(W_{sdt-1}) + \beta_2 F_{sdt-1} + \beta_3 X_{sdt-1} + \theta Z_{sdt} + \alpha_s + \alpha_d + \alpha_{dt} + \epsilon_{sdt}. \tag{2.2}$$

(2.2) could be estimated using OLS. However, migration between pairs of countries may be zero in a substantial percentage of observations, and omitting those zero observations biases the regression results. In particular, due to the fact that (2.2) is a pseudo-gravity model in a double log form, a large number of observations could be dropped because of the zero values in the dependent variables M_{sdt}. Hence, standard regression methods, such as the OLS, require omitting observations with zero values, which leads to inconsistent estimates of the coefficients due to selection bias. Furthermore, a second source of bias is related to the fact that if the variance of ϵ_{sdt} depends on one or more of the determinants of M_{sdt}, then the expected value of ϵ_{sdt} will also depend on some of the regressors in the presence of zeroes (Silva and Tenreyro, 2006).

These methodological challenges in estimating gravity models can be addressed using the Poisson Pseudo-Maximum Likelihood (PPML) estimator (Silva and Tenreyro, 2006; Beine and Parsons, 2015). Using

PPML, we estimate the exponential of the gravity model as

$$M_{sdt} = exp[\beta_1 ln(W_{sdt-1}) + \beta_2 F_{sdt-1} + \beta_3 X_{sdt-1} + \theta Z_{sdt} + \alpha_s + \alpha_d + \alpha_{dt}] u_{sdt}, \tag{2.3}$$

where $u_{sdt} = exp(\epsilon_{sdt})$ is a multiplicative error term.

In addition to the regular migration flows (M_{sdt}), we also estimate a gravity model for the flow of asylum seekers (AS_{sdt}) from the source country s to the destination country d in year t.

2.2.1 Conceptual Foundations

A growing body of theoretical and empirical literature on international migration has documented that individuals have complex and often overlapping motivations for leaving their places of origin, including income (Naudé, 2010; Dutta and Roy, 2011; Clemens et al., 2014; Docquier et al., 2018), political instability (Naudé, 2010; Docquier et al., 2018; Clemens, 2017; Shrestha, 2017), migrant networks (Beine and Parsons, 2015), institutions (Baudassé et al., 2018) and climate change (Beine et al., 2015). In the following, we discuss the conceptual foundations for the set of human security variables that we consider in the current study by categorizing them as economic factors, civil conflicts, institutional quality, and ethnic tensions of source countries.

Economic factors: A large body of literature indicates that a significant difference in average income in terms of average GDP per capita

(GDPPC) between the origin and destination countries is a principal determinant of international migration. In other words, relatively low personal income in the source countries in comparison with per capita income in the destination countries motivates potential immigrants. In our context, hence, the actual economic deprivation and abject poverty of most African countries will likely have an enormous push effect on the migrants and refugees of Africa. On the other hand, economic development and relatively high personal incomes in Europe attract immigrants.

Civil conflicts: It is assumed that individuals will have a greater incentive to migrate when there are civil conflicts than when there are no conflicts in their home countries. In the absence of safety and security the expected returns of labour, development projects, and investments is significantly decreased. Since civil conflicts directly affect both the security and livelihood of individuals' people are likely to be forced to migrate in search of alternative means of survival. Controlling for economic and other determinants, on the average one may, therefore, expect to see a higher number of migrants from source countries devastated by civil conflicts. The African political condition, in general, is characterized by historical injustices and oppressive governance structures (Ongayo, 2008). Since attaining independence, many states have experienced civil wars, large-scale mass killings of civilians, and other forms of direct political violence for decades (Dunn, 2009). The United Nations Conference on Trade And Devolopment (2018) illustrated that in the African context, severe conflicts often lead to a

significantly increased flow of internally displaced people or refugees, if they flee across borders. Moreover, conflicts can also be a driver of economic migration. Hence, conflict is one of the human security indicators that are explored in this chapter.

Institutions: Likewise, weak performance of institutions in source countries may be a sufficient motive for emigrating in search of institutions which perform better (Baudassé et al., 2018). Very often totalitarian regimes are a push factor of migration. The lack of democracy, political rights, and civil liberties, and endemic corruption act as push factors for migrants seeking greater freedoms (Solimano, 2010). In line with the Hirschman (1970) "exit and voice" dichotomy, individuals may decide to migrate when institutions are not satisfactory and fundamental human rights are violated.

Mostly in countries where there are autocratic political systems and state sponsored persecution, harassment, discrimination and torture people who disagree with the policy or ideology of the government, and/or have minority religious beliefs or ethnic backgrounds (Solimano, 2010) are pushed toward migration. In non-democratic countries, even when individuals are not physically persecuted restraints of fundamental freedoms may ultimately motivate them to leave their country of origin. In sum, if the political environment is hostile, then the tendency is that the economic outcome is most likely to be poor. Therefore, such situations trigger migration for political and economic reasons. In a similar vein, Solimano (2005) argues that in non-democratic

cases "individuals that are unsatisfied or disconnect with the current political and economic conditions may choose to exit their home countries". Hence, we assume that better institutional quality reduces migration flow while poor institutional performances motivate individuals to leave their home countries and relocate to more democratic and safer countries where they can pursue better freedom, protection, education, and careers. Accordingly, Naudé (2010); Ruyssen and Rayp (2014); Lucas (2015), among others, show that the African migration flow—at least the intra-African migration—is profoundly influenced by the political set-up of the continent. Furthermore, due to the overly repressive character of the regimes, the majority of African countries have been receiving the lowest rankings on political rights and civil liberties for decades.[7] These preceding events have made Africans vulnerable to displacement, including migration within and emigration from the continent.

Ethnicity: Ruble (1989) ethnic identity "developed, displayed, manipulated or ignored in accordance with the demands of a particular situation". In this context, it is noteworthy to consider that social identity serves as a structural foundation for potential group formation and social conflicts. When conflict arises, ethnic identities may result in suboptimal behavior (Constant and Zimmermann, 2011). Existing literature has argued that ethnic tensions raises the likelihood of waging civil conflicts and engenders a kind of "structural violence". Ethnic heterogeneity increases the probability of civil conflicts and

[7]See https://freedomhouse.org/regions/sub-saharan-africa.

civil wars (see, for instance, Reynal-Querol and Montalvo, 2005; Esteban et al., 2012; Giménez-Gómez and Zergawu, 2018). Fearon and Laitin (2003) further stipulate that between 1945 and 1999, about 51% of major civil wars originated as a result of ethnic conflicts. Moreover, where there are ethnic tensions women, children, and other vulnerable social groups are exposed to various forms of sexual, physical, and non-physical violence in relation to their ethnic-national identities (Korac, 1998). Hence, we assume that civil conflict and structural violence such as molestation, marginalization, ethnic tension, segregation, and the development of an underclass along the line of ethnic identities significantly increases the flow of international migration.

Bang and Mitra (2013) show that ethnic-related conflicts increase the fraction of skilled labor migration.

In this context, the contemporary African political set-up is profoundly influenced by ethnic identity. The inter-ethnic relationships in Africa, especially in the political arena, are associated with competition, exclusiveness, the prevalence of genocidal violence and conflicts among ethnic groups (Berman, 1998 and Daley, 2006). On top of the political violence and instabilities, human and democratic rights violations are prevalent across the African continent (Mutua, 2009).

2.3 Data

We construct a new panel dataset with information on migration flows and asylum seeking as well as on several macroeconomic, political and institutional factors covering 21 European countries of destination and 51 African countries of origin from 1990 to 2014 (see the list of countries in Tables 2.5 and 2.6 in Subsection 2.6.3).

While the choice of the post-Cold-War period is dictated by data availability it has two main merits. First, it is the most relevant period with respect to the current migration crises in Europe. In the trends of international migration towards Western Europe observed since the Second World War, there are three distinct periods: (1) the labor migration from the 1950s till the beginning of the 1970s; (2) the family migration in the mid-1970s, and (3) the 'third wave', of the international movement that emerged in the post-Cold War era (Geddes and Scholten, 2016). It is noteworthy that there has been a marked surge in the number of immigrants, specially asylum seekers, to Europe since the early 1990s. Second, this period also allows us to take into consideration some of the former Eastern European countries, for which data is typically available after 1990.

In the following two sub-sections, we describe in detail the dependent and explanatory variables that we use in the current study. Specifically, we first present the sources and the construction of migration data, both regular flows and asylum seekers, which are our alternative dependent variables. Subsequently, we discuss the explanatory vari-

ables, which include several economic and political determinants of international migration (Table 2.1 reports summary statistics for these variables).

Table 2.1: Summary statistics

Variables	N	mean	sd	min	max
Bilateral migration flow	26,775	260.5	1,815	0	84,978
Bilateral asylum seekers	26,775	74.7	369.6	0	15,819
GDP per capita destination (in thousand)	26,723	31,624	21,429	1,445	116,664
GDP per capita source (in thousand)	26,670	1,624	2,709	64.81	23,348
Urban population at source (in thousand)	26,712	606,591	956,926	34,481	83,300
Political Stability at source	26,775	50.4	5.88	42	61
Network (stock migration in thousand)	26,775	7,212	309	27	183
Common language	26,775	0.133	0.339	0	1
Colonial ties	26,775	0.0523	0.223	0	1
Distance	26,250	5,699	2,076	716.6	16,632
Hegemony	26,775	0.0467	0.211	0	1
Common legislation	26,775	0.284	0.451	0	1
Ethnic fractionalization at source	24,150	0.615	0.267	0.05	0.959
Ethnic polarization at source	24,150	0.527	0.209	0.014	0.897
Civil conflict at source	26712	.210	.407	0	1
Political Regime Characteristics at source	26,775	0.231	5.456	-9	10
Political rights at source	26,775	0.392	0.488	0	1
Civil liberates at source	26,775	0.471	0.499	0	1
Government stability at source	19,425	2.756	1.867	0	1
Socio-economic conditions at source	19,425	3.982	1.649	0	8
Corruption at source	19,425	2.406	0.962	0	5
Law and order at source	19,425	3.089	1.182	0	6
Democratic accountability at source	19, 425	3.021	1.286	0	6
Bureaucracy quality at source	19,425	1.379	0.892	0	4
Investment portfolio at source	19,425	7.16	1.46	4	9
External conflict at source	19,425	10.24	0.862	0	12
Religious tension at source	19,425	1.8	1.452	9	12

Note: N, mean, sd, min and max represent number of observations, mean, standard deviation, minimum and maximum, respectively.

2.3.1 Migration flows and asylum seeking

The main dependent variable in (2.2) is the annual migration inflows from the source country s to the destination country d, in a given year t M_{tsd}. These data measure the yearly inflow of foreign-born population

by nationality into the host countries. Note that the inflow migration data exclude temporary visitors with a tourist visa or people who travel for reasons of study, medical and business purposes.[8]

To construct the migration inflow series, we use two complementary data sources, which help us to cover the entire sample period. The first source is the 2015 update of the international migration flows data of the International Migration Report (IMR) of the United Nations (United Nations, 2015a). This database contains time series data on the flows of international migrants as recorded by 45 destination countries.[9]

This database considers legal migration only and presents both inflows and outflows according to the place of birth, citizenship, place of previous or next residence, both for foreigners and nationals, as reported by each country's national agencies in charge of collecting migration data. For most African source countries, the database covers the period from the early 1990s until 2013, despite missing data for some bilateral countries. The second source of data is the OECD 'International Migration Database' (IMD), which comprises migration inflows data starting from the mid-1990s up to 2014.[10] Similar to the

[8]In practice, national definitions of migration vary. The United Nations (1998) defines a person who changes his or her place of usual residence for at least one year as a long-term migrant, while a person who changes his or her place of usual residence for more than three months but less than one year is considered to be a short-term migrant.

[9]See a list of countries and the data at http://www.un.org/en/development/desa/population/migration/data/empirical2/migrationflows.shtml.

[10]The data are available at https://stats.oecd.org/Index.aspx?DataSetCode=MIG.

IMR, IMD contains time-series data on the inflows of foreign populations into 35 OECD countries for which data are available. However, IMD has a broader coverage than IMR.

In order to merge these two databases, it is critical to ensure that the two databases have uniform definitions of migration. The majority of destination countries report migration data that is collected from a population register or are based on the number of residence permits issued. We observe that in most cases these databases embrace overlapping figures when data are available. Hence, our final migration inflow series is constructed mainly by using IMD, which has a broader coverage of countries and periods. The IMR data are used to fill missing values. In rare cases, we fill missing data using simple averages between data of the previous year and the following year.[11]

The African migration trend map in Fig. 2.1 in Subsection 2.6.2 shows the trend in migration flows from Africa to Europe. In general, there has been a significant rise in the number of Africans migrating to the selected European destination countries. Closer observations of the data reveal that African immigrants are highly concentrated in a few Western European countries. In particular, the maps display that the major destinations of African migrants over the years are France, Italy, Spain and the United Kingdom, although a considerable number

[11]About 5% of the migration flows data have been filled by interpolating observations to fill in missing values in intermediate years. Results obtained by re-estimating our baseline results by dropping these missing values leaves our main findings qualitatively unaffected, with little changes in the magnitudes of the estimated coefficients. These results are available upon request.

of Africans have also migrated into Belgium, Germany, and Sweden. A large number of African immigrants in France and the United Kingdom may be partly linked to the fact that about 65 percent of the contemporary African nations are former colonies of these two countries. It is well-established in the literature that colonial ties increase migration flows by creating, for example, common official languages, cultural attachments, social networks and business relations (Fawcett, 1989). Southern European countries, such as Italy and Spain, did not have many African colonies, and hence have weaker colonial ties with African countries. African migrant inflows into these Mediterranean countries might have been induced by their strong economic performance since the 1980s, as well as their growing economic integration with other European countries as indicated by Bonifazi et al. (2009) and Ortega and Peri (2013). However, this might also reflect the fact that many immigrants use Southern European countries as a transition point to move to other Western European countries. Moreover, as Fig. 2.1 shows, the North African countries Algeria, Egypt, Morocco and Tunisia have been sending a consistently high number of migrants to Europe in the two and a half decades under study. This might be related to the fact that geographical proximity as well as the presence of a large Diaspora has served to attract immigrants due to lower migration costs.

As an alternative dependent variable, we use data on yearly inflows of asylum seekers into the European host countries by African countries of origin from 1990 to 2014. Utilizing the asylum seeking data

helps to address two crucial issues. First, the widely-applied migration inflow data comprise the regular inflow of immigrants into the hosting countries only. As a result, the database omits the significant number of asylum seekers, which are the primary source of the refugee crisis in Europe.[12] Second, we check the robustness of our results on the political determinants of extra-continental migration by using the asylum seeking data.

According to the 1986 definition of the United Nations High Commissioner for Refugees (UNHCR), an asylum seeker is a person who has sought protection as a refugee, but whose claim for refugee status has not yet been assessed.[13] Data on the inflow of asylum seekers come from the IMD database, which in turn is based on data provided by the UNHCR. The UNHCR regularly produces complete statistics on refugees and asylum seekers in OECD countries and worldwide.[14] In rare cases, we also use the original UNHCR database to complement

[12]Some authors believe that the tightness of immigration laws of European countries for African citizens exposes the majority of African immigrants to smuggling and human trafficking in the process of entering Europe, critically risking their lives (Castles, 2004; De Haas, 2007; De Haas, 2011).

[13]http://www.unhcr.org/excom/exconc/3ae68c43c0/detention-refugees-asylum-seekers.html.

[14]These figures are most often derived from administrative sources, but differences are dependant on the nature of the data provided. In some countries, asylum seekers are enumerated when the application is accepted. Consequently, they are shown in the statistics at that time rather than at the date when they arrived in the country. Acceptance of the application means that the administrative authorities will review the applicant's claims and grant them certain rights during this review procedure. In other countries, the data do not include the applicant's family members, who are admitted under different provisions (e.g., France), while other countries count the entire family (e.g., Switzerland).

missing data.[15]

Fig. 2.2 in Subsection 2.6.2 exhibits the inflow of African asylum seekers into the European destination countries. The maps display an upward trend in the flow of asylum seekers from Africa into many European countries: France, Germany, Italy, Sweden, Switzerland and the United Kingdom. In particular, the annual inflow of African asylum seekers has markedly risen in Germany since 2010. Additionally, Italy is a significant entry point for African refugees. Despite being stricken by the Euro-zone crisis (Mody and Sandri, 2012), tens of thousands of asylum seeker migrants continue to board overcrowded and unsafe boats heading to Italy, putting their lives in grave danger.

2.3.2 Economic and political determinants of migration

To substantiate the effects of the broad human security factors of international migration, we consider several economic, political and social determinants of migration as explanatory variables, as aforementioned in Subsection 2.2.1.

Economic factors: To capture the impact of African economic drivers on Europe migration flows, we use the logarithm of GDPPC in the source and the destination countries.[16] Our primary source of the

[15]Downloadable at www.unhcr.org/figures-at-a-glance.html.

[16]Adjusted by Purchasing Power Parity, PPP (at constant 2005 prices in US Dollars).

GDPPC data is the 'National Accounts Main Aggregates Database' of the Economic Statistics Branch of the United Nations Statistics Division.[17]

Political factors: To investigate the effects of political factors on migration flows from Africa to Europe, we employ several political indices. We measure political instability by means of the civil conflict incidence, which is an indicator variable that takes a value of 1 if there is a new or existing conflict in year t, and 0 otherwise. We obtain the data on conflict incidence from the Armed Conflict Database of the Uppsala Conflict Data Program (UCDP) and the Peace Research Institute of Oslo (PRIO).[18] This database codes armed conflicts at a low threshold of 25 battle-related deaths per year in conflicts where there is the use of armed force between two parties, of which at least one is the government (Pettersson and Wallensteen, 2015).

Additionally, while the index of ethnic fractionalization measures the probability that two randomly selected individuals in a country will belong to different ethnic groups, the ethnic polarization indexes measure the normalized distance of a particular distribution of ethnic groups from a bimodal distribution. Data for both ethnic fractionalization and polarization indices are obtained from Reynal-Querol and Montalvo (2005). Following Esteban et al. (2012), we use time-invariant versions of these variables, since short-run changes are likely to be correlated with the incidence of conflict.

[17]See at https://unstats.un.org/unsd/snaama/introduction.asp.
[18]The data are available at:www.pcr.uu.se/data/.

To assess how the characteristics of the political regimes affect the bilateral migration flows, we use indicators for democratic and autocratic patterns of authority. In the Polity IV database, the polity series contains coded annual information on the level of democracy and autocracy, both ranging from 0 (low) to 10 (high) (Marshall et al., 2012).[19] Following Esteban et al. (2012) and Giménez-Gómez and Zergawu (2018), we transform these indices into time-invariant dummy variables as short-run changes in these measures are likely to be correlated with the incidence of conflicts. Specifically, a country receives a time-invariant 1 (considered democratic) if it has received a democracy score higher than or equal to 4 for 40% of the years and 0 otherwise. The autocracy dummy is also computed in the same manner.

Furthermore, we test the effect on bilateral migration of civil liberty and political rights variables, which are measured on a scale from 1 to 7 (where 1 represents the highest levels of liberties and political rights and 7 indicates the lowest level). For ease of interpretation, we converted these indicators to time-varying dummy variables. Specifically, a country is considered to have a favorable rating for civil liberty or political rights in a specific year (dummy variable takes on 1) if it receives a rating less than or equal to 4, and 0 otherwise. The data source for these variables is Freedom House (2016).[20]

To examine the effects of overall political stability of the countries

[19]The Polity IV data are based on evaluations of the competitiveness of elections, openness of the state, the nature of political participation, and the extent of checks on executive authority (Marshall et al., 2012).

[20]See https://freedomhouse.org/report-types/freedom-world.

on bilateral migration flows, we use the political risk index from the International Country Risk Guide (ICRG) dataset. The Political Risk rating includes 12 weighted variables covering both political and social attributes. The risk components include government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. In the dataset, the minimum number of points that can be assigned to each component is zero, while the maximum depends on the indexed weight that component is given in the overall political risk assessment (Howell, 2011).

Finally, we also consider proxies for migration costs using geographical and cultural distances. In analyzing the costs of international migration, Beine and Parsons (2015) note that migrant networks play a fundamental role in determining migration flow from two channels. In terms of the *assimilation channel*, networks affect private costs and benefits of migration, and from the point of view of the *policy channel*, they lower legal entry barriers through family reunification programs (Beine and Parsons, 2015). Hence, we estimate both migration flows and asylum seeking trends by controlling migrant networks using bilateral migration stocks. Our migrant network or diaspora variable, which is again taken from the IMD database, is defined as the bilateral migrant stock in the beginning of the year to which a flow corresponds. Additionally, we use bilateral geographical distances between the two capital cities (in kilometers) and dummy variables for the common lan-

guage, common legal origin, colonial ties (if a source country is a former colony of a destination), and hegemony (for a post-colonial relationship). These variables are widely used in the migration literature as important determinants of migration decision (see, for instance, Taylor, 1994; Leblang et al., 2009; Kim and Cohen, 2010; Mayda, 2010; Ortega and Peri, 2013; Ruyssen and Rayp, 2014; Beine et al., 2015; and Docquier et al., 2018).

2.4 Results

In this section, we discuss the empirical results of the determinants of migration flows from Africa to Europe using data on both regular and asylum seeker migration flows.

First, we discuss determinants of the regular migration flows from African countries to Europe as specified in (2.3). Subsequently, we re-estimate (2.3) using the flows of asylum seekers as an alternative dependent variable.

2.4.1 Baseline Results

In (2.3), our dependent variable is annual migration flows between bilateral countries. Our main hypothesis, in this case, is that human security conditions significantly influence international migration flows in different ways. Specifically, GDP per capita at the source and the destination countries are expected to have opposite effects on migration flows. While higher income per capita at the source country is expected to show a negative effect on migration flows, income per capita at the destination country is expected to display a positive impact. Improvements in democratization and human rights protections (both political and civil rights) within the source country is expected to reduce the outflow of migrants, whereas civil wars, institutional autocracy and ethnic cleansing are expected to increase the rate of migration outflow. Concerning variables such as proxy that measure migration costs, geographical distance is expected to have a negative effect while social networks (proxied by migrant stocks) are expected to increase migration flows by reducing psychological costs, facilitating integration into the host society and increasing the possibility of obtaining a job. Having a colonial tie or cultural attachments (common official language and a common source of legislation) is also expected to reduce migration costs and, hence, increase migration flows.

Table 2.2 presents the baseline results of the determinants of the regular migration flows from Africa to Europe. We consider the economic and political indicators of human security together with indi-

cators for the cost of migration that are discussed in Section 2.3 as explanatory variables. In all the specifications, source-country fixed effects (α_s) are included. Additionally, we add destination-country fixed effects (α_d) in columns 1 and 2, year fixed effects (α_t) in column 2, and time-variant fixed effects of the destination country (α_{dt}) in columns 3–8.

Generally, the coefficients for all explanatory variables are statistically significant and carry the expected signs in most of the specifications. Higher per capita income in destination countries and civil conflicts, state autocracy and ethnic tension in source countries lead to higher migration flows, as expected. The control variables such as migrant networks, shared legal roots, common official language and colonial legacy positively impact on migration flows. Conversely, higher GDP per capita, democracy, political rights, civil liberties and the landlockedness of the source country decrease migration flows. Moreover, the larger the distance between the source and the destination countries, the lower is the bilateral migration flows.

To put results into the context of the estimated elasticities, we analyze the variables across specific models. In Table 2.2, while column 1 controls for fixed effects of source countries (α_s) and destination countries (α_d) only, column 2 includes time effects (α_t) as well. The results show that a 10 percent increase in the average income earned per person in destination countries leads to an increase of about 8.9 and 17.1 percent, respectively, in annual bilateral migration flows. Whereas, a

10 percent increase in per capita income in source countries is associated with a 3.9 and 2.1 percent decrease in dyadic migration flows (from source to destination countries), respectively. The results for the per capita income are consistent with much of the literature (e.g., Bertoli and Moraga, 2013; Ortega and Peri, 2013). These results suggest that higher average income levels in destination countries exert a strong pull factor on migration flows compared to the potential reduction effects of income growth in source countries. A possible explanation could be that income levels in source countries are substantially lower in absolute terms than in destination countries. Regarding economic development in the source countries, the literature depicts controversial results between income in origin countries and emigration. Clemens et al. (2014) summarize that across the literature cross-sectional studies generally find either a positive or inverted-U relationship between income and emigration from low-income countries, while time-series studies do not find a consistent relationship between income and emigration.[21] Accordingly, policy makers' conventional wisdom (Clemens et al., 2014), our findings confirm that an increase in average income per capita in the origin countries is negatively correlated with migration flows, which coincide with several studies that use time-series macro studies and control for country fixed effects (see, for instance, Carlos, 2002; Hatton and Williamson, 2003; Clark et al., 2004; Clark et al., 2007; Bertoli and Moraga, 2013; and, Ortega and Peri, 2013).

[21]For studies related to cross-sectional analysis, see, for instance, Hatton and Williamson (2005); Czaika (2012); Belloc (2015); Dao et al. (2018).

Table 2.2: Determinants of African migration flows to Europe

Migration flows (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Log GDP per capita								
destination$_{t-1}$	0.889***	1.706***						
	[0.156]	[0.353]						
Log GDP per capita								
source$_{t-1}$	-0.394***	-0.214***	-0.140***	-0.140***	-0.136***	-0.123**	-0.106*	-0.206*
	[0.0656]	[0.0586]	[0.0509]	[0.0509]	[0.0518]	[0.0613]	[0.0555]	[0.116]
Civil conflict source$_{t-1}$	0.238***	0.290***	0.288***	0.288***	0.290***	0.241***	0.319***	0.305***
	[0.0422]	[0.0356]	[0.0397]	[0.0397]	[0.0423]	[0.0483]	[0.0515]	[0.0830]
Democracy Source$_{t-1}$	-3.199***	-2.858***	-2.245***	-0.844***	-1.119*	-1.378***	-1.946***	-1.985***
	[0.247]	[0.252]	[0.135]	[0.179]	[0.657]	[0.338]	[0.381]	[0.478]
Autocracy Source$_{t-1}$	0.0396	0.140***	0.0632*	0.0632*	0.0630*	0.118**	0.0943	0.0274
	[0.0633]	[0.0487]	[0.0348]	[0.0348]	[0.0347]	[0.0494]	[0.0702]	[0.0732]
Political rights Source$_{t-1}$	-0.0390	-0.111*	-0.0970	-0.0970	-0.0948	-0.394***	-0.293***	-0.139
	[0.0896]	[0.0649]	[0.0787]	[0.0787]	[0.0758]	[0.0999]	[0.101]	[0.120]
Civil liberties Source$_{t-1}$	-0.105	-0.0766*	-0.0610	-0.0610	-0.0625	-0.0205	-0.00242	0.0141
	[0.0730]	[0.0458]	[0.0400]	[0.0400]	[0.0402]	[0.0691]	[0.0538]	[0.0923]
Ethnic polarization source	3.234***	2.860***	2.470***		6.037***	1.446***	2.499***	2.456***
	[0.213]	[0.254]	[0.223]		[0.900]	[0.363]	[0.787]	[0.713]
Ethnic fractionalization source				3.354***				
				[0.224]				

Continuation of Table 2.2

Migration flows (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Log urban population source$_{t-1}$					-0.0687			
					[0.209]			
Landlocked source					-0.615***			
					[0.221]			
Network$_{t-1}$	0.0479***	0.0411***	0.0726***	0.0726***	0.0728***	0.129***	0.0956***	0.0698*
	[0.00814]	[0.00862]	[0.0124]	[0.0124]	[0.0127]	[0.0180]	[0.00990]	[0.0365]
Log distance	-0.634***	-0.620***	-0.629***	-0.629***	-0.629***	-0.796***	-0.370***	-0.758***
	[0.0548]	[0.0534]	[0.0565]	[0.0565]	[0.0564]	[0.0744]	[0.0559]	[0.168]
Common legislation	0.902***	0.910***	0.856***	0.856***	0.855***	1.193***	0.947***	0.614***
	[0.0650]	[0.0671]	[0.0668]	[0.0668]	[0.0663]	[0.112]	[0.0815]	[0.180]
Common language	0.697***	0.729***	0.521***	0.521***	0.521***	1.067***	0.904***	0.669***
	[0.0481]	[0.0496]	[0.0617]	[0.0617]	[0.0604]	[0.0527]	[0.0645]	[0.131]
Colonial ties	1.104***	1.106***	1.129***	1.129***	1.127***	1.177***	1.084***	1.013***
	[0.0545]	[0.0537]	[0.0546]	[0.0546]	[0.0583]	[0.0852]	[0.0486]	[0.140]
Hegemony	-0.00614	0.0104	-0.0981*	-0.0981*	-0.0975*	-0.711***	-0.580***	-0.0709
	[0.0631]	[0.0640]	[0.0575]	[0.0575]	[0.0578]	[0.105]	[0.0971]	[0.0863]
Constant	2.852**	-4.745*	3.611***	2.323***	8.411***	10.13***	6.646***	-12.48***
	[1.182]	[2.630]	[0.511]	[0.722]	[2.698]	[0.707]	[0.861]	[0.851]
Observations	22,635	22,635	20,790	20,790	20,790	18,630	18,858	3,555
R-squared	0.709	0.755	0.846	0.846	0.846	0.916	0.904	0.864
Fixed Effects								
Destination(α_d)	YES	YES	No	No	No	No	No	No

Continuation of Table 2.2

Migration flows (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
$Source(\alpha_s)$	YES	YES	YES	YES	YES	YES	YES	YES
$Destination - year(\alpha_{dt})$	No	No	YES	YES	YES	YES	YES	YES
$Year(\alpha_t)$	No	YES	No	No	No	No	No	No
Sample	All	All	All	All	All	non-(UK + France)	SSA	5 years

Note: results are obtained by using the Poisson Pseudo-Maximum Likelihood (PPML) estimation method.The estimation period is 1990-2014. column 8 uses only years 1990, 1995, 2000, 2005 and 2010. column 6 omits France and the United Kingdom; and column 7 considers the sub-Saharan Africa sub-sample. Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

Since our main emphasis is on the human security factors in source countries, we use appropriate fixed effects (i.e., time-invariant source-countries (α_s) and time-variant destination-countries (α_{dt})), as provided by column 3. Specifically, the results show that an increase in per capita income in source countries leads also to a decrease in migration flows in this specification. Concerning political determinants of migration, most of the variables exert statistically significant results with the expected signs. In particular, the incidences of violent civil conflicts in source countries are a significant push factor, which is in accordance with Naudé (2010), who finds that violent civil conflicts are important drivers of net migration from sub-Saharan Africa.

An increase in the government's autocracy in the source countries, which is an indicator of the presence of political persecution or human rights violations, leads to an increase in international migration flows. Democratization processes in source countries, have a strong reducing effect on bilateral migration flows. Specifically, the size of the impact of the democratization dummy variable is particularly large: using coefficients from the standardized variables, it is apparent that democratization has the largest impact of all the determinants of bilateral migration flows. Furthermore, measures of political and civil rights in source countries, which proxy political freedom, often carry the expected negative signs, although estimated coefficients are rarely statistically significant. The results on the crucial roles of political institutions (democracy, autocracy, political rights and civil liberties) on the flow of African migration to Europe are consistent with most

of the literature on international migration and institutions (Baudassé et al., 2018).[22]

The other most important non-economic determinants of migration flows are ethnic polarization and fractionalization, which measure the level of ethnic diversity and tensions in source countries. In this regard, increases in these social heterogeneity factors are found to strongly increase increase migration outflows.

The remaining variables, which mainly proxy migration costs, are also significant and carry the expected signs. Specifically, migrant networks have a strong positive impact on bilateral migration flows. Moreover, those African countries that are farther away from Europe have fewer migrants heading to Europe due to distance-related costs. On the contrary, variables of colonial ties, common legal roots, common official language, and other cultural attachments increase migration flows.

The rest of the columns of Table 2.2 contain robustness check results. In column 4, we employ ethnic fractionalization instead of ethnic polarization, and find a qualitatively similar pushing effect of ethnic tensions on migration flows. In column 5 we add urban population

[22]Baudassé et al. (2018) provides an in-depth review of the literature on international migration and institutions and discusses the effect of institutions on migration flows using the exit and voice dichotomy of Hirschman (1970). Accordingly, if people have the freedom to express their dissatisfaction through the existing institutional frameworks, they choose the voice option and prefer to stay at home. Whereas, violations of basic rights due to poor quality of institutions lead them to choose the exit option and leave their country.

pressure and landlockedness of source countries to investigate their potential effects on migration flows. The results show that having a larger ratio of urban population does not have a statistically significant effect on bilateral migration flows. However, the landlockedness of the source countries decreases migration flows, as expected. The effects of the rest of the explanatory variables remain qualitatively unaffected. In column 6 we estimate determinants of bilateral migration flows omitting the two main former colonial powers in Africa (the United Kingdom, and France). Once more, results on the main and control variables remain robust and highly significant.

Historically, due to geographical proximity, Europe is the main destination for North African migrants (Zlotnik, 1991; Flahaux and De Haas, 2016). However, in the last two decades, there has been a surge in the number of migrants from sub-Saharan Africa towards Europe. Accordingly, in column 7 we estimate a sub-sample of sub-Saharan African migration trends by omitting the five North African countries from the full sample. The results show that the baseline estimation is still robust despite the fact that the number of observations are reduced by 9%. Finally, column 8 presents estimation results of a sub-sample where five-years period average are considered (1990-94, 1995-99, 2000-2004, 2005-2009 and 2010-2014). These results show that while an increase in income per capita in source is still a relevant factor for reducing international migration flows, violent civil conflicts and ethnic tensions are also important push factors for African migrants. Notwithstanding, improvements of political rights in source

substantially decrease the rate of bilateral migration flows in the five-year intervals. These results confirm the robustness of our baseline findings.

In summary, our baseline results reveal that human security determinants are important factors in shaping the South-North migration trends in the past few decades. The estimation results suggest that African migration patterns towards Europe are significantly influenced by economic, political, social and cultural conditions. In particular, African extra-continental migrations are caused by poverty, civil wars, ethnic tensions, and civil and political rights violations. The results also indicate that improvements in per capita income and political conditions in source countries are negatively related to the rate of migration flows. Furthermore, social, cultural, geopolitical and historical ties with European countries have a significant impact in influencing the trend in African migration towards Europe.

2.4.2 The relative importance of economic and non-economic drivers of migration

Since our findings indicate that both economic and non-economic factors are important drivers of African migration to Europe, we assess the relative importance of these two groups of migration drivers (Subsection 2.6.3 provides the standarized version of these variables.). In doing so, next, we compare the (absolute value of) statistically significant coefficients of standardized migration determinants. It is worth

emphasizing that most of the political determinants of migration affect economic development in origin and economic development affects political factors including the probability of occurrence of civil conflicts. Therefore, our comparison here does not consider the full (direct and indirect) impacts of the economic and non-economic drivers of migration flows.[23]

The main economic determinant of migration flows from Africa to Europe is the GDP per capita in source and destination countries. Due to the fact that the GDP per capita in destination countries is incompatible with country-year fixed effects, it is only reported in columns 1 and 2 of Table 2.2. Hence, our comparison will be confined to these two columns. Furthermore, non-economic migration drivers can also be divided into political drivers, including the incidence of civil conflicts, democracy and ethnic polarization, and migration cost related factors such as migrant networks and physical distance between the source and destination countries.

A one-standard-deviation change from the mean of the economic determinants (GDP per capita in source and destination countries) produces changes in migration flows of about 125% and 177%, in columns 1 and 2 of Table 2.7, respectively. Among political factors, only civil conflicts, democracy, autocracy and ethnic polarization have statistically significant effects on migration flows. Adding the respective

[23]As Clemens (2017, p.3) states, 'causal attribution in this literature is complicated by the fact that confounding determinants of migration may be varying across time in correlation with national-level violence.'

coefficients of these standardized variables, we obtain the sums 162% and 221% in columns 1 and 2 of Table 2.7, respectively.

Since most of the variables related with migration cost have a statistically significant impact on migrant flows from Africa to Europe, we consider migrant networks, distance, common language, common legislation and colonial ties. The sum of the respective coefficients of these standardized variables is about 150% and 146% in columns 1 and 2 of Table 2.7, respectively. These results clearly highlight the importance of political factors as drivers of migration flows from Africa to Europe. Nonetheless, the relative importance of economic drivers and cost-related factors depends on the specification of the model. Specifically, since the specification in column 2 of Table 2.7 includes both economic determinants (GDP per capita in the source and destination countries), then it appears to be more appropriate for comparing the relative effects of economic and cost-related drivers of migration flows. Accordingly, economic motivations are found to have larger impacts on migrant flows from Africa to Europe than do the migration cost and culture related factors.

Therefore, these results provide convincing evidence that African migration flows to Europe are driven by broader human security factors beyond economic motivations.

2.4.3 Determinants of the flow of African asylum seekers to Europe

Each year thousands of migrants from Africa enter Europe after braving the perils of crossing the Mediterranean Sea using inadequate transport conditions. Although several factors could be listed as reasons, the EU's tightened entry policies for African migrants, on the one hand, and the migrants lack of financial means and appropriate travel documents, on the other hand, are thought to have forced African immigrants to choose irregular routes (Hansen and Jonsson, 2011; Flahaux and De Haas, 2016). To examine the extent to which human security factors determine the flow of African asylum seekers to Europe, we re-estimate (2.3) using data on the flow of asylum seekers.

Table 2.3: Determinants of the flows of African asylum seekers to Europe

Asylum seekers (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Log GDP per capita								
destination$_{t-1}$	0.284	1.005***						
	[0.191]	[0.323]						
Log GDP per capita								
source$_{t-1}$	-0.230***	-0.173***	-0.177***	-0.177***	-0.140**	-0.244***	-0.180***	-0.508***
	[0.0766]	[0.0641]	[0.0652]	[0.0652]	[0.0664]	[0.0753]	[0.0679]	[0.0963]
Civil conflict source$_{t-1}$	0.351***	0.399***	0.393***	0.393***	0.403***	0.503***	0.405***	0.463***
	[0.0724]	[0.0551]	[0.0594]	[0.0594]	[0.0586]	[0.0502]	[0.0608]	[0.134]
Democracy Source$_{t-1}$	-3.135***	-3.074***	-2.877***	-1.206***	-6.956***	-2.307***	-3.559***	-2.277***
	[0.285]	[0.234]	[0.246]	[0.186]	[0.780]	[0.302]	[0.249]	[0.532]
Autocracy Source$_{t-1}$	-0.409***	-0.161	-0.113	-0.113	-0.111	-0.0743	-0.0908	-0.152
	[0.126]	[0.149]	[0.150]	[0.150]	[0.148]	[0.161]	[0.165]	[0.215]
Political rights Source$_{t-1}$	-0.0448	-0.196*	-0.175	-0.175	-0.180*	-0.127	-0.200*	-0.147
	[0.105]	[0.109]	[0.108]	[0.108]	[0.108]	[0.123]	[0.107]	[0.172]
Civil liberties Source$_{t-1}$	-0.461***	-0.357***	-0.348***	-0.348***	-0.338***	-0.364***	-0.346***	-0.330**
	[0.0883]	[0.0712]	[0.0773]	[0.0773]	[0.0783]	[0.0894]	[0.0709]	[0.167]
Ethnic polarization source	4.028***	4.077***	3.882***		7.331***	2.963***	4.092***	4.298***
	[0.490]	[0.444]	[0.464]		[1.258]	[0.519]	[0.675]	[1.205]
Ethnic fractionalization source				5.676***				
				[0.487]				
Network$_{t-1}$	0.0336***	0.0242***	0.0619***	0.0619***	0.0628***	0.0992***	0.0772***	0.0550***

Continuation of Table 2.3

Asylum seekers (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
	[0.00444]	[0.00377]	[0.00723]	[0.00723]	[0.00762]	[0.00445]	[0.00705]	[0.0150]
Log Population source$_{t-1}$					-0.938***			
					[0.215]			
Landlocked source					-0.517*			
					[0.299]			
Log Distance	-0.406**	-0.407**	-0.390**	-0.390**	-0.384**	-0.539**	0.0547	-0.451
	[0.178]	[0.180]	[0.171]	[0.171]	[0.171]	[0.241]	[0.226]	[0.384]
Common legislation	0.358***	0.370***	0.336***	0.336***	0.336***	0.161**	0.447***	0.416***
	[0.0399]	[0.0389]	[0.0534]	[0.0534]	[0.0528]	[0.0788]	[0.0606]	[0.108]
Common language	0.750***	0.777***	0.636***	0.636***	0.628***	0.942***	0.684***	0.762***
	[0.0809]	[0.0756]	[0.0740]	[0.0740]	[0.0723]	[0.0655]	[0.0789]	[0.143]
Colonial ties	0.445***	0.466***	0.408***	0.408***	0.415***	0.517***	0.379***	0.475**
	[0.0500]	[0.0495]	[0.0582]	[0.0582]	[0.0593]	[0.118]	[0.0521]	[0.226]
Hegemony	-0.275**	-0.254**	-0.362***	-0.362***	-0.366***	-0.879***	-0.577***	-0.425
	[0.107]	[0.107]	[0.123]	[0.123]	[0.125]	[0.216]	[0.147]	[0.308]
Constant	5.138***	-1.025	6.946***	4.597***	19.53***	8.542***	3.637*	5.890*
	[1.969]	[2.401]	[1.321]	[1.573]	[2.980]	[1.658]	[1.867]	[3.171]
Observations	22,635	22,635	21,105	21,105	21,105	18,945	19,698	3,555
R-squared	0.284	0.315	0.470	0.470	0.469	0.578	0.503	0.586
Fixed Effects								
Destination(α_d)	YES	YES	No	No	No	No	No	No
Source(α_s)	YES	YES	YES	YES	YES	YES	YES	YES

Continuation of Table 2.3

Asylum seekers (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
$Destination - year(\alpha_{dt})$	No	No	YES	YES	YES	YES	YES	YES
$Year(\alpha_t)$	No	YES	No	No	No	No	No	No
Sample	All	All	All	All	All	non-(UK + France)	SSA	5 years

Note: The estimation period is 1990-2014. column 5 includes the post-1995 sub-sample. column 7 uses only years 1990, 1995, 2000, 2005 and 2010. column 5 omits France and the United Kingdom; and column 6 considers Sub-Saharan Africa sub-sample. Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

The estimation results of the determinants of the flows of asylum seekers from Africa to Europe are reported in Table 2.3. While we still use the specifications used in Table 2.2, the dependent variable here is the number of annual asylum seekers, which represents the flows of asylum seekers. The results obtained by using asylum seeker data are qualitatively similar to the baseline results using regular migration flow data. Specifically, an increase in the GDP per capita of the destination countries is associated with an increase in the number of asylum seekers. As in Table 2.2, throughout the specifications, an increase in the GDP per capita of the source countries leads to a decrease in the number of asylum seekers. Moreover, political turmoil, fear of being persecuted for reasons of ethnicity or political opinion are found to drive African migrants to demand refugee status in Europe. As expected, the democratization of source countries' leads to a decrease in bilateral flows of asylum seekers. Throughout the specifications, the institutional quality variable has a statistically significant impact with the expected sign. Furthermore, migration cost and culture-related control variables remain statistically significant with the expected signs.

Regarding the relative importance of economic and non-economic drivers of asylum seekers (see Subsection 2.6.3), Table 2.8 depicts the political factors as the most important drivers of asylum seekers from Africa to Europe. In particular, considering column 1 (2), a one-standard-deviation change in economic, political and migration-cost related factors produces a 26% (110%), 327% (278%) and 98% (93%) change, respectively, in migration flows from Africa to Europe. These

findings are also consistent with the results in the study by Moore and Shellman (2004) where, by using a global sample of countries spanning the period 1952–1995, it is documented that violent persecution (by the authorities or dissident groups) has a substantially larger impact on forced migration flows than economic factors. Moreover, it is also noteworthy that the relative importance of political factors is stronger for the flows of asylum seekers (Table 2.8) than it is for regular migration flows (Table 2.7).

2.4.4 The role of political determinants on migration flows

As shown in Tables 2.2 and 2.3, African migration to Europe is not only driven by economic factors, but also by non-economic motivations such as civil conflicts, human rights violations and political stability. In the following, we emphasize the role of political factors in extra-continental migration flows. In doing so, Table 2.4 reports the results from regressions that include broader determinants of international (regular and asylum seeker) migration flows between Africa and Europe.[24] Specifically, we consider measures of political stability and specific measures of political risks in source countries, in addition to the aforementioned political and distributional indexes in Tables 2.2 and 2.3. In order to facilitate the comparison, column 1 of Table 2.4 replicates column 3 of the baseline specification in Tables 2.2.

[24]We extend the previous regression model in (2.3) by adding vectors of political instability in aggregated and disaggregated forms.

column 2 of Table 2.4 estimates the impacts of political variables focusing on political stability and institutions as the key determinants of international migration. It is noteworthy that in this specification economic determinants are omitted and the coefficients remain with the expected sign, except for institutionalized democracy. Once more, civil conflict, institutionalized autocracy, and ethnic polarization are positively correlated with migration flows. In column 3 we consider alternative and disaggregated measures of both economic and political institutions, which are taken from the International Country Risk Guide (Howell, 2011). The set of indexes that we use in this analysis include socioeconomic conditions, investment profile, democratic accountability, government stability, control of corruption, law and order, bureaucractic quality, external conflict and religious tension of the source countries. With the exception of external conflict and religious tension, the rest of the indicators of institutional quality are supposed to have a decreasing effect on migration outflows.

In a similar manner, to increases in GDP per capita, improvements in socioeconomic conditions in source countries has a negative impact on migration flows. The result implies that better economic institutions in origin have a reducing effect on migration outflows. Among the measures of the quality of political institutions, democratic accountability significantly determines migration outflows. This result is consistent with the effect of institutionalized democracy indicator that is used in our baseline results (see column 1). Although some of the variables carry the expected signs, across specifications, the impacts

of most of the remaining economic and political institutions variables are not statistically significant.[25] Column 3 combines variables used in column 1 and 2, but the democracy variable of column 1 is omitted to avoid redundancy with democratic accountability. The results remain generally similar to that of columns 1 and 2.

The results in columns $4-6$ of Table 2.4 are obtained from the same specifications as results in columns $1-3$, but using the flow of asylum seekers instead of regular migration flows as the dependent variable. The results on the impact of political determinants on regular migration flows remain valid for the flow of asylum seekers.

[25]The estimates for those political institutional variables remain insignificant even if we include each of the institutional variables separately with the control variables. These results are available upon request.

Table 2.4: Political factors as determinants of migration flows

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML
Dependant Variables (in level)	M. Flows	M. Flows	M. Flows	A.Seekers	A.Seekers	A.Seekers
Log GDP per capita						
source$_{t-1}$	-0.140***			-0.177***		
	[0.0509]			[0.0652]		
Civil conflict source$_{t-1}$	0.288***		0.279***	0.393***		0.274***
	[0.0397]		[0.0386]	[0.0594]		[0.0693]
Democracy source$_{t-1}$	-2.245***			-2.877***		
	[0.135]			[0.246]		
Autocracy source$_{t-1}$	0.0632*		0.0732**	-0.113		-0.239
	[0.0348]		[0.0345]	[0.150]		[0.166]
Political rights source$_{t-1}$	-0.0970		-0.154**	-0.175		-0.206***
	[0.0787]		[0.0689]	[0.108]		[0.0782]
Civil liberties Source$_{t-1}$	-0.0610		0.00888	-0.348***		-0.202**
	[0.0400]		[0.0490]	[0.0773]		[0.0821]
Ethnic polarization source	2.470***		0.726***	3.882***		5.095***
	[0.223]		[0.246]	[0.464]		[0.408]
Socioeconomic conditions source$_{t-1}$		-0.0396*	-0.0441**		0.0493	0.0307
		[0.0209]	[0.0183]		[0.0428]	[0.0420]
Investment profile source$_{t-1}$		0.0135	0.0102		-0.0491**	-0.0447*
		[0.0109]	[0.0117]		[0.0245]	[0.0235]
Democratic accountability$_{t-1}$		-0.0648***	-0.0734***		-0.103***	-0.0627**
		[0.0152]	[0.0130]		[0.0296]	[0.0286]
Government stability$_{t-1}$		0.0207	0.0329		-0.0632	-0.0593

Continuation of Table 2.4

Column	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML
Dependant Variables (in level)	M. Flows	M. Flows	M. Flows	A.Seekers	A.Seekers	A.Seekers
		[0.0232]	[0.0265]		[0.0485]	[0.0510]
Control of corruption$_{t-1}$		0.0131	0.00216		0.0412	0.0600
		[0.0231]	[0.0276]		[0.0711]	[0.0713]
Law and order source$_{t-1}$		-0.0291	-0.0416		-0.0788	-0.0607
		[0.0534]	[0.0459]		[0.0752]	[0.0607]
Bureaucracy quality source$_{t-1}$		-0.0457	-0.0332		-0.0637	-0.00965
		[0.0497]	[0.0529]		[0.0631]	[0.0691]
External conflict$_{t-1}$		-0.0311	-0.0127		-0.0872**	-0.0625*
		[0.0217]	[0.0188]		[0.0352]	[0.0325]
Religious tension$_{t-1}$		0.0385	0.0302		-0.0627*	-0.0790**
		[0.0273]	[0.0255]		[0.0363]	[0.0376]
Network$_{t-1}$	0.0726***	0.0704***	0.0680***	0.0619***	0.0631***	0.0627***
	[0.0124]	[0.0122]	[0.0120]	[0.00723]	[0.00718]	[0.00705]
Log Distance	-0.629***	-0.549***	-0.497***	-0.390**	-0.273	-0.316*
	[0.0565]	[0.0529]	[0.0513]	[0.171]	[0.173]	[0.177]
Common legislation	0.856***	0.987***	1.151***	0.336***	0.228***	0.261***
	[0.0668]	[0.0696]	[0.0622]	[0.0534]	[0.0491]	[0.0513]
Common language	0.521***	0.287***	0.271***	0.636***	0.655***	0.637***
	[0.0617]	[0.0484]	[0.0476]	[0.0740]	[0.0811]	[0.0823]
Colonial ties	1.129***	1.217***	1.292***	0.408***	0.609***	0.665***
	[0.0546]	[0.0818]	[0.0764]	[0.0582]	[0.112]	[0.112]
Hegemony	-0.0981*	-0.165***	-0.0671	-0.362***	-0.474***	-0.513***
	[0.0575]	[0.0606]	[0.0680]	[0.123]	[0.183]	[0.178]

Continuation of Table 2.4

Column	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML
Dependant Variables (in level)	M. Flows	M. Flows	M. Flows	A.Seekers	A.Seekers	A.Seekers
Constant	3.611***	9.469***	8.868***	6.946***	8.449***	5.856***
	[0.511]	[0.619]	[0.661]	[1.321]	[1.374]	[1.498]
Observations	20,790	16,704	15,708	21,105	16,884	15,946
R-squared	0.846	0.845	0.856	0.470	0.487	0.491
Fixed Effects						
$Destination(\alpha_d)$	YES	YES	YES	YES	YES	YES
$Destination-year(\alpha_{dt})$	YES	YES	YES	YES	YES	YES
Sample	All	All	All	All	All	All

Note: Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

2.4.5 Robustness checks: using the OLS estimation

Given that our estimation model is a pseudo-gravity model, we use the PPML estimator from Tables 2.2 to 2.4, which flexibly accounts for a significant proportion of zero observations in the dependent variables. In this section, we check for the robustness of the benchmark results by performing OLS estimation on (2.2) using the positive migration flows only, as in Ortega and Peri (2013). These results are documented in Tables 2.9 and 2.10 in Subsection 2.6.3. For each specification both the source-country fixed effects (α_s) and time-destination fixed effects (α_{dt}) are included.

Tables 2.9 and 2.10, respectively, reveal the estimation results obtained when zero bilateral regular and asylum seeker migration flows are omitted. In both cases, GDP per capita in source and destination countries, civil conflict, institutional autocracy and ethnic distributional indexes, political stability (both in source and the destination countries), socioeconomic conditions, law and order, bureaucracy quality as well as the control variables display effects that are qualitatively similar to our baseline results in Tables 2.2 and 2.3. Furthermore, in the linear estimation, the civil liberty parameter of the source country significantly affects migration flows.

Another robustness check involves using the PPML estimator as in Tables 2.2 and 2.3, but re-estimating the models by gradually increasing the number of political determinants of migration. This is meant

to check if our main estimation results are affected by the fairly large number of explanatory variables we considered. In doing so, the Tables 2.11 and 2.12 depict a remarkable degree of robustness to progressively include political drivers of migration. For instance, GDP per capita in the source country has a significantly negative impact on migration flows from Africa to Europe although the coefficient on GDP per capita of the source country decreases in absolute terms from -0.185 in the most parsimonious specification to -0.140 in the most comprehensive model in Table 2.2. Similarly, the incidence of civil conflicts has a robust positive effect on migration flows, and the magnitude of its impact remains largely unaffected by the inclusion of additional explanatory variables. The same can be said of the effects of democracy score, distance, common legislation, common language, colonial ties, migrant networks and hegemony. The only exception is the measure of civil liberties in source country, which always carries a negative coefficient, but becomes statistically significant in only one of the specifications.

2.5 Conclusions

The current migration and refugee crisis in Europe requires an understanding of the different migration drivers beyond the well-known economic determinants. While a few extant studies have examined determinants of African migration flows, they have, however, either focused exclusively on intra-African migration flows or studied international migration from Africa together with intra-African flows.

The present study aims to fill this gap in the literature by providing a thorough empirical examination of the role played by human security factors in explaining trends in African migration to Europe during the period 1990–2014. To estimate the pseudo-gravity model of bilateral migration flows, we employ the Poisson Pseudo-Maximum Likelihood (PPML) estimator, which is particularly suitable in regressions where the dependent variable has a significant proportion of zero values (Beine and Parsons, 2015). This study contributes to the literature on the determinants of international migration flows in two ways.

First, as aforementioned, we empirically analyze the specific Africa to Europe trends of migration flows. From the perspective of European destination countries, African migration flows show a dramatic rise and curbing this flow is among the top policy issues. From the view of African source countries, Europe continues to be an important destination for extra-continental African migrants, thanks to the historical and geopolitical ties between the two continents. Hence, this emphasis helps us to highlight essential determinants of migration flows from Africa to Europe.

Second, although the importance of non-economic factors such as civil wars and conflicts in international migration is well-documented in the literature (Naudé, 2010; Docquier et al., 2018), the present paper additionally highlights the roles of institutions and social heterogeneity indicators such as ethnic polarization and religious tension in the

decisions of individuals to emigrate.

Extra-continental migration is not only costly but it is also risky. Hence, despite abject poverty, wars, civil conflicts, severe political persecution, and human rights abuses, the majority of the world population stays at home or moves mainly to neighboring countries in their search for safety and protection. Our analysis underscores that, in addition to the obvious economic determinants and violent conflicts, a combination of several push and pull factors including political conditions (ongoing violence and instability, low institutional quality) and pre-existing socio-cultural structures influence the migration choice of individuals.

We find several notable results. First, most of the human security indicators significantly determine annual migration flows from Africa into European countries. Per capita income growth in a given European destination is associated with an increase in immigrant flows while per capita income growth in a given source country is negatively related with emigration from Africa. Rising political persecution, human right violations, political instability and civil conflicts in source countries are also associated with increased migration flows into European destination countries. Second, in conjunction with the regular trends of migration flows, asylum seekers from Africa also have a combination of political and economic motivations to claim refugee status. Hence, categorizing African immigrants as " bogus asylum seekers", in general terms would be highly misleading and could result in misguided

migration policies. Third, cultural and migration cost-related factors, such as migrant networks, colonial ties, common languages, physical distance and living in a land-locked country have shown significant effects on trends in African migration to Europe.

The aforementioned findings have significant policy implications for managing the recent migration and refugee crisis in Europe. The African migration flows to Europe are complex and driven by mixed push and pull factors. The central point of this discussion is acknowledging the heterogeneity of the flows, since a valid response will need to be grounded in a sound understanding of fundamental causes of the flows.

Further,the motives, patterns and trends of African migrants' should be seen from the broader human security point of view. Overlooking the political factors, which significantly influence international migration, and attempting to address only the economic causes through investing in Africa, may have counterproductive consequences. Therefore, the collaboration among African source countries and all European countries and institutions should be based not only on the economic development of the source countries, but also on the promotion of human security: peace, human rights, democracy, and social stability.

Finally, it is noteworthy that, although our main result—that broader human security factors drive international migration—is based on data on trends in African migration to Europe in the post-Cold War period,

it appears to be generalizable to the rest of the world for three main reasons. First, there are already studies on other parts of the world that have found violent conflicts as a significant driver of emigration (Clemens, 2017; Shrestha, 2017). Second, the frequency and severity of violent conflicts and human rights abuses in some parts of the world, especially the Middle East, are as high as, if not higher than, in Africa. This also makes human security factors potentially important drivers of emigration from other conflict-ridden regions, such as the Middle East. Third, although the post-Cold War period is a period when Africa has witnessed some of the most violent conflicts in the world (e.g., Rwanda, Congo, Liberia), this is, at the same time, a period during which several African countries experienced peaceful transfers of power (e.g., Liberia, Ghana, Nigeria, Tanzania). Hence, our results may be also applied to politically stable emerging economies in Asia and Latin America.

2.6 Appendix

2.6.1 Migration Model theoretical background

As aforementioned, economic deprivation, political persecution, poor governance, ethnic tension, structural violence and conflicts in the source countries are considered as the main factors of migration decision-making. Additionally, economic, social and political enabling environments in host countries are taken as pull factors. In this sense, De Haas (2011) strongly argues that 'on the macro-level, migration processes are driven by a multitude of economic and non-economic factors and, on the micro-level, migrants are motivated by a combination of multiple, interconnected but analytically distinct social, cultural, economic and political factors.' Therefore, migration decisions should be viewed as a process of location choices (staying at home or moving to an optimal destination) in which individuals form expectations about where they will have better opportunities and protections, in order to maximize their utility.

Accordingly, taking as a starting point the random utility maximization (RUM) theoretical models developed by Beine et al. (2011), Grogger and Hanson (2011) and Ortega and Peri (2013), in which income maximization problems or wage differentials are a driving force to make a migration decision, we emphasize the broader human security conditions. Specifically, we analyze a more substantial number of political and socio-cultural factors that may influence the individual's

decision to move from his/her current location. Furthermore, instead of considering a unique destination, our model considers multiple destinations.

Formally, out of the set of N global countries, the individual i from his source country $s \in S = s_1, s_2.....s_n$, where $S \subseteq N$, makes a decision of whether to stay in s or to migrate to the destination country $d \in D = d_1, d_2...d_n$, where $D \subseteq N$. It is noteworthy note that as indicated in Kennan and Walker (2013) among others, individuals are assumed to have rational expectations. Thus, they make an informed decision to migrate in seeking their maximum utility. Therefore, following Ortega and Peri (2013), we formulate a utility function u of the individual i by staying in the source-country s or by migrating into the destination country d that are given by (2.4) and (2.5), respectively,

$$u_{ssi} = \gamma_{ss} + \pi_{ss} + \nu_{ssi}, \tag{2.4}$$

$$u_{sdi} = \gamma_{sd} + \pi_{sd} + \nu_{sdi}. \tag{2.5}$$

The terms $\gamma_{ss}(\gamma_{sd})$ and $\pi_{ss}(\pi_{sd})$ are country-of-source (country-of-destination) specific variables, which capture the average earnings and security of individual i by staying in home country s (leaving for destination country d), respectively. Furthermore, the individual-specific terms ν_{ssi} and ν_{sdi} denote unobserved components of an individual's utility in each source and destination country, respectively. These random variables ν_{ssi} and ν_{sdi} are assumed to be identically and inde-

pendently distributed as type-I extreme values across locations and periods.

Migration costs also determine the magnitude of utility for a migrating individual. Let C_{sdi} denote the total cost of migration from country s to country d for individual i. These relocation costs are also influenced by specific features between the source and host countries such as culture, language, geographic distance, and the attractiveness or accessibility and entry policies of host-countries (Ortega and Peri, 2009; Beine et al., 2016 and Bertoli and Moraga, 2015).[26].

Therefore, each individual acts to maximize the expected present value of the realized payoffs, net of moving costs. For this minimization, we consider that

$$\gamma_{sd} = h_1(W_{di}) - C_{sdi}$$

and

$$\pi_{sd} = h_2(F_{di}) - C_{sdi},$$

where W_{di} is the present value of expected earnings in the form of wage, and F_{di} is the level of freedom that an individual i enjoys by staying in

[26]Besides, Grogger and Hanson (2011) designate two components of migration costs: a fixed monetary cost of moving from country s to d, k_{sd}, and a cost that varies as per the individual's character, $\overset{j}{l}_{sd}$, where (j) denotes individual's skills, such that $C_{sdi} = k_{sd} + \overset{j}{l}_{sd}$. Moreover, the migration costs also have various time and destination dimensions, which could be time-invariant (such as geographic and cultural distance) or time-varying and destination-specific (such as migration policies and the benevolence of the welfare state) (Beine and Parsons, 2015).

the destination country d. Note that the probability of an individual immigrant settling in the destination country with the expected human security gains depends on the socio-economic and political stability of the destination country.[27] Thus, to capture this situation, we introduce a binary function $\lambda(\varpi, f)$, where ϖ is employment probability, and f denotes the chances of individual i being protected by moving to country d. Accordingly, $\lambda(\varpi, f) = 0$, if the individual migrant is not employed or does not get the expected protection and security; and, $\lambda(\varpi, f) = 1$, if the migrant individual gets employed and enjoys legal and political protections in the hosting country. Henceforth, the utility function following Ortega and Peri (2013) is formally represented as

$$u_{sdi} = \lambda(\varpi, f)(h_1(W_{di}) + h_2(F_{di})) + \nu_{sdi}$$

It is noteworthy that a fairly general stochastic specification is considered in the above equations. The rationale behind this assumption is that there would be expected differences between prospective migrants and non-migrants. However, in many aspects, it is difficult to measure these differences since prospective migrants may differ in their talents, attitudes toward risk, financial liquidity and insurance, human rights abuses, psychological costs of living abroad, etc. (Ken-

[27]Extensive hostility, abuse of and violence against migrants has become much more visible worldwide in recent years (Taran, 2001). Current human rights reports show that racist and xenophobic speech and violence, harassment, threats and killings targeting asylum seekers and migrants are increasing across the European Union. These crimes against migrants are committed organized way by state authorities, private companies or individuals or vigilante groups.

nan and Walker, 2013, Ortega and Peri, 2013). Note that $\nu_{ssi} = \epsilon_{ssi}$ is a stochastic term for the stay-at-home utility function. However, for each $d \in D_s$, the term ν_{sdi} comprises two uncorrelated error terms: $\nu_{sdi} = \zeta + \epsilon_{sdi}$, where ζ is drawn from a probability distribution with mean zero. These individual random effects are correlated, i.e., utility of migrants in a given destination country can interact. The random variables ϵ_{ssi} and ϵ_{sdi} are all identically and independently distributed as type-I extreme value. Using the nested logit model approach of McFadden (1978), which allows for more general substitution patterns, it is possible to get a closed-form solution for choice probabilities of staying in the source country (P_s) or migrating to the destination (P_d).

The probability of an individual staying in the source country s is given by

$$P_s = \frac{e^{\gamma_{ss}+\pi_{ss}}}{e^{\gamma_{ss}+\pi_{ss}} + \left(\sum_{q \in D} e^{\frac{\gamma_{sd}+\pi_{sd}}{T}}\right)^T} \tag{2.6}$$

where T is a discordance parameter and controls for the degree of correlation across the stochastic terms in the equations. As Ortega and Peri (2013) argue, the setting $T = 1$ coincides with zero correlation, which obtains an expression for the log odds ratio of the logit model. Assuming that there will be a non-negative correlation in the error terms in our destination equations, then T will take a value $0 < T < 1$.

The probability of an individual migrating from the source country s to the destination country d is given by

$$P_d = \frac{\left(\sum_{q\in D} e^{\frac{\gamma_{sq}+\pi_{sq}}{T}}\right)^T}{e^{\gamma_{ss}+\pi_{ss}} + \left(\sum_{q\in D} e^{\frac{\gamma_{sq}+\pi_{sq}}{T}}\right)^T} \frac{e^{\frac{\gamma_{sd}+\pi_{sd}}{T}}}{\sum_{q\in D} e^{\frac{\gamma_{sq}+\pi_{sq}}{T}}} \tag{2.7}$$

Accordingly, the odds ratios between staying in a home country and migrating into a destination country ($ln\frac{P_d}{P_s}$) is obtained as

$$ln\frac{P_d}{P_s} = \frac{\gamma_{sd}+\pi_{sd}}{T} - (\gamma_{ss}+\pi_{ss}) - (1-T)(ln\sum_{q\in D} e^{\frac{\gamma_{sq}+\pi_{sq}}{T}}) \tag{2.8}$$

The migrants' decision to move to two different destination countries depends on the relative attractiveness of the destinations. Hence, the proportion of migrants going to d_1 or d_2 is given by the logit model odds ratio in

$$ln\frac{P_d 1}{P_d 2} = ln\frac{\gamma_{sd1}+\pi_{sd1}}{\gamma_{sd2}+\pi_{sd2}} \tag{2.9}$$

The proportion of people who choose to migrate into destination country d as compared to the total number of potential migrants from the source country s is denoted by $P_d = (n_{sd}/\sum_{q=1}^{D} n_{sq})$, where n_{sq} is the number of individuals born in country s who decided to live in country q. Following this logic, we can rewrite (2.8) as

$$ln(n_{sd}) = ln(n_{ss}) + \frac{\gamma_{sd}+\pi_{sd}}{T} - (\gamma_{ss}+\pi_{ss}) - (1-T)(ln\sum_{q\in D} e^{\frac{\gamma_{sq}+\pi_{sq}}{T}}) \tag{2.10}$$

It is noteworthy that in the above equation, all quantities in the right-hand-side, except $\gamma_{sd} + \pi_{sd}$, are constant across destinations and vary by the source country only. By considering variations over time, individual migrants may be exposed to different levels of economic benefits and social, legal and political protections in different destination countries. Furthermore, to deal with a time-specific migration choice decision (as a consequence of the relative attractiveness of the destination countries and the proportion of migration flows towards these nations, Ortega and Peri, 2013), the previous equation can be rewritten as

$$ln(n_{sdt}) = ln(n_{sst}) + \frac{\gamma_{sdt} + \pi_{sdt}}{T} - (\gamma_{sst} + \pi_{sst}) - (1-T)(ln\sum_{q\in D} e^{\frac{\gamma_{sqt}+\pi_{sqt}}{T}}) \tag{2.11}$$

In a similar way, the share of people who choose to stay in the home country, provided the pushing factors, is denoted by $P_s = n_{ss}/\sum_{q=1}^{D} n_{sq}$. Then, the probability of individuals staying in the source country over multiple periods, given the pushing factors from the home country and the potential probability to migrate into d, is given by

$$ln(n_{sst}) = ln(n_{sdt}) + \gamma_{sst} + \pi_{sst} - (\frac{\gamma_{sst} + \pi_{sst}}{T}) - (1-T)(ln\sum_{q\in D} e^{\frac{\gamma_{sqt}+\pi_{sqt}}{T}}) \tag{2.12}$$

Therefore, our empirical specification, which is specified in section two of this chapter is obtained from (2.11) and (2.12) is formally given

as

$$ln(n_{sdt}) = \beta_{0_{sdt}} + \beta_1 \gamma_{sdt} + \beta_2 \pi_{sdt} + \epsilon_{sdt}, \tag{2.13}$$

where $\beta_{0_{sdt}}$ stands for source-by-year and destination-by-year fixed effects, which vary over time and by countries of source and destination. The term ϵ_{sdt} is an error term capturing various unobserved factors of the approximate probabilities in the estimation sample. The empirical specification in (2.13) is similar to a pseudo-gravity model of international migration, which considers the logarithm of bilateral migration flows as a function of country fixed effects with respect to source and destination countries and general migration costs (see, for example, Mayda, 2010, Bertoli and Moraga, 2013, Ortega and Peri, 2013, McKenzie et al., 2014, Beine et al., 2016).

2.6.2 Trends in African migration flows

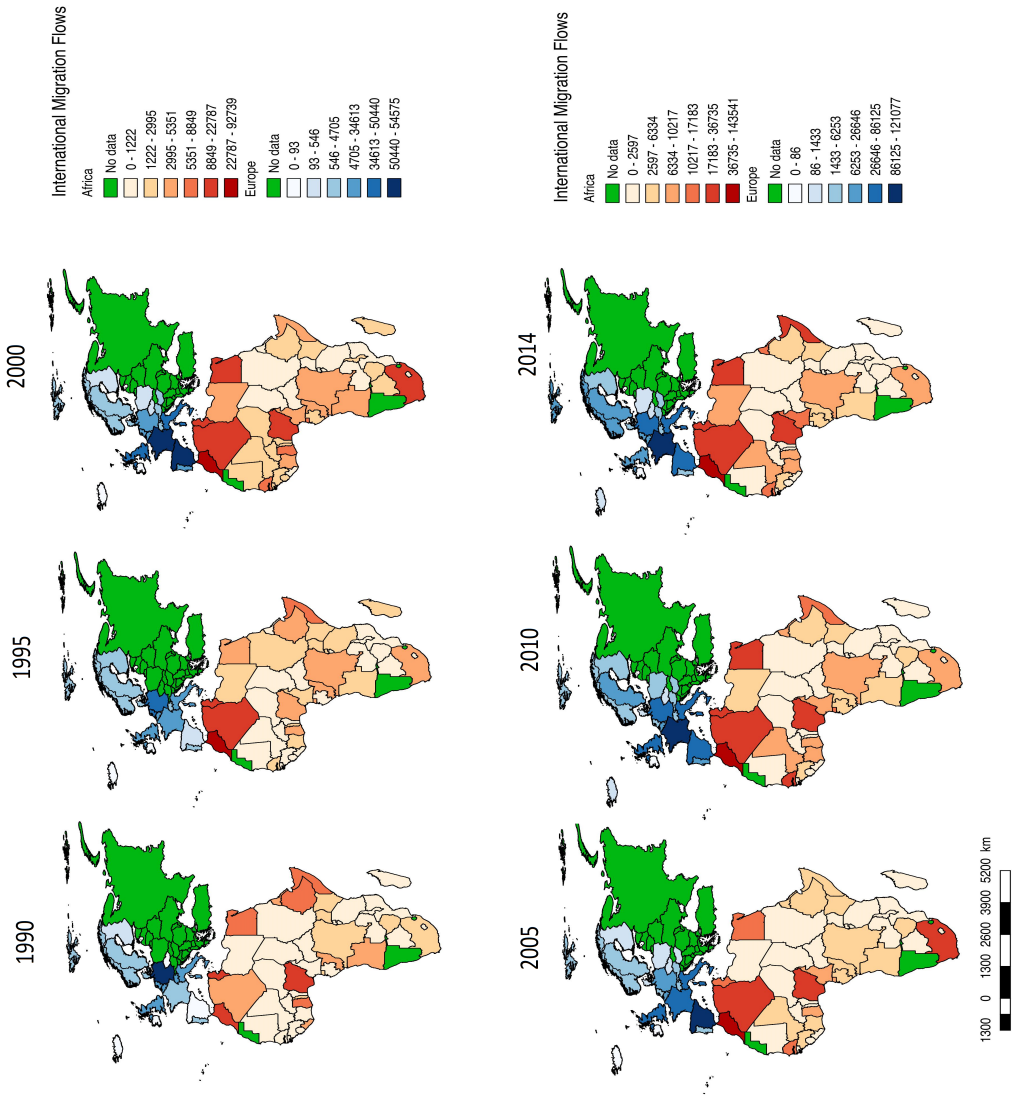

Figure 2.1: Absolute number of African regular migration flows towards Europe in 1990, 1995, 2000, 2005, 2010, 2014. Note that there are two distinct scales for the colors: one scale for the upper three maps and another scale for the lower three maps. Source: Authors' calculations based on data described in the text.

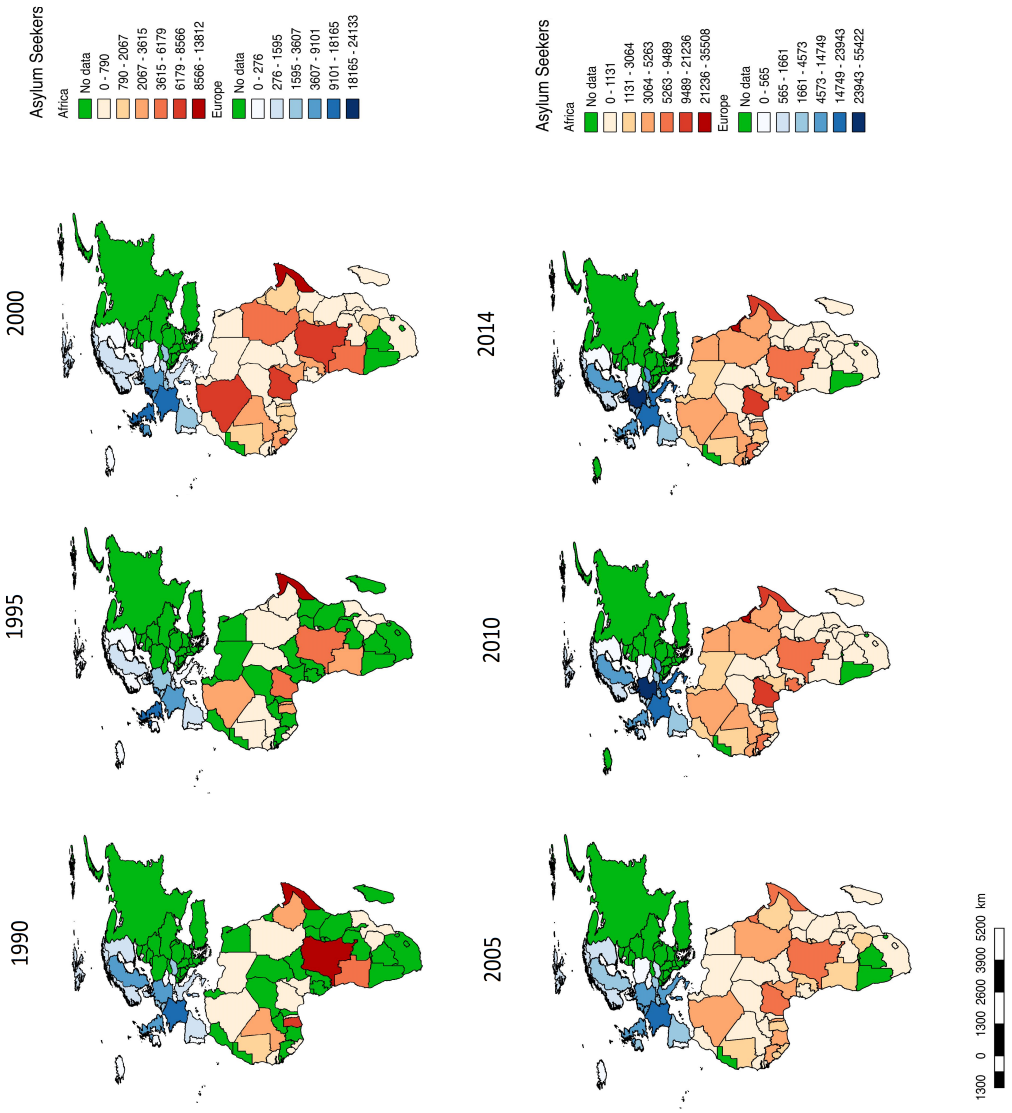

Figure 2.2: Absolute number of African asylum seekers in Europe in 1990, 1995, 2000, 2005, 2010, 2014. Note that there are two distinct scales for the colors: one scale for the upper three maps and another scale for the lower three maps. Source: Authors' calculations based on data described in the text.

2.6.3 Data details and results of further estimations

Table 2.5: List of African countries of sources of migrants and asylum seekers

Code	country	code	country	code	country	code	country
1	Algeria	16	Egypt	31	Mali	46	Tunisia
2	Angola	17	Equatorial Guinea	32	Mozambique	47	Tanzania
3	Burundi	18	Eritrea	33	Mauritania	48	South Africa
4	Benin	19	Ethiopia	34	Mauritius	49	Uganda
5	Burkina Faso	20	Gabon	35	Malawi	50	Zambia
6	Botswana	21	Ghana	36	Namibia	51	Zimbabwe
7	Chad	22	Guinea	37	Niger		
8	Central AR	23	Gambia	38	Nigeria		
9	Côte d'Ivoire	24	Guinea-Bissau	39	Rwanda		
10	Cameroon	25	Kenya	40	Sudan		
11	Congo, DR	26	Liberia	41	Senegal		
12	Congo	27	Libya	42	Sierra Leone		
13	Comoros	28	Lesotho	43	Somalia		
14	Cape Verde	29	Morocco	44	Seychelles		
15	Djibouti	30	Madagascar	45	Togo		

Table 2.6: List of European countries of destinations for African migrants

Code	country	code	country	code	country
1	Austria	8	Greece	15	Norway
2	Belgium	9	Hungary	16	Poland
3	Czech Republic	10	Iceland	17	Portugal
4	Denmark	11	Ireland	18	Spain
5	Finland	12	Italy	19	Sweden
6	France	13	Luxembourg	20	Switzerland
7	Germany	14	Netherlands	21	United Kingdom

Table 2.7: Determinants of African migration flows to Europe: regular flows: standardized variables

Migration flows								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
StdLog GDP per capita								
destination$_{t-1}$	0.792***	1.520***						
	[0.139]	[0.314]						
StdLog GDP per capita								
source$_{t-1}$	-0.459***	-0.250***	-0.163***	-0.210***	-0.159***	-0.143**	-0.124*	-0.240*
	[0.0763]	[0.0683]	[0.0592]	[0.0561]	[0.0603]	[0.0714]	[0.0646]	[0.136]
StdCivil conflict source$_{t-1}$	0.0974***	0.119***	0.117***	0.104***	0.119***	0.0985***	0.130***	0.124***
	[0.0172]	[0.0146]	[0.0162]	[0.0137]	[0.0173]	[0.0197]	[0.0210]	[0.0339]
StdDemocracy Source$_{t-1}$	-0.848***	-1.427***	-1.120***	-1.089***	0.381**	-0.688***	-0.971***	-0.991***
	[0.123]	[0.126]	[0.0672]	[0.101]	[0.157]	[0.169]	[0.190]	[0.238]
StdAutocracy Source$_{t-1}$	0.0174	0.0612***	0.0277*	0.0318**	0.0276*	0.0516**	0.0413	0.0120
	[0.0277]	[0.0213]	[0.0153]	[0.0158]	[0.0152]	[0.0216]	[0.0308]	[0.0321]
StdPolitical rights Source$_{t-1}$	-0.0190	-0.0543*	-0.0473	-0.0401	-0.0462	-0.192***	-0.143***	-0.0677
	[0.0437]	[0.0317]	[0.0384]	[0.0416]	[0.0370]	[0.0487]	[0.0492]	[0.0585]
StdCivil liberties Source$_{t-1}$	-0.0522	-0.0382*	-0.0305	-0.0392**	-0.0312	-0.0102	-0.00121	0.00704
	[0.0364]	[0.0229]	[0.0200]	[0.0198]	[0.0201]	[0.0345]	[0.0269]	[0.0460]
StdEthnic polarization source	0.677***	0.599***	0.517***		-0.747***	0.303***	0.523***	0.514***
	[0.0446]	[0.0531]	[0.0467]		[0.229]	[0.0761]	[0.165]	[0.149]
StdEthnic fractionalization source					0.432***			
					[0.162]			
StdUrban population source					-0.0999			

Continuation of Table 2.7

Migration flows								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
					[0.304]			
StdLandlocked source					-1.020***			
					[0.190]			
StdNetwork$_{t-1}$	0.331***	0.284***	0.502***	0.502***	0.503***	0.892***	0.661***	0.483*
	[0.0563]	[0.0596]	[0.0857]	[0.0851]	[0.0876]	[0.124]	[0.0685]	[0.253]
StdLog Distance	-0.279***	-0.273***	-0.277***	-0.310***	-0.277***	-0.351***	-0.163***	-0.334***
	[0.0241]	[0.0235]	[0.0249]	[0.0233]	[0.0248]	[0.0328]	[0.0246]	[0.0740]
StdCommon legislation	0.407***	0.410***	0.386***	0.368***	0.386***	0.538***	0.427***	0.277***
	[0.0293]	[0.0302]	[0.0301]	[0.0269]	[0.0299]	[0.0507]	[0.0367]	[0.0810]
StdCommon language	0.236***	0.247***	0.177***	0.103***	0.177***	0.362***	0.306***	0.227***
	[0.0163]	[0.0168]	[0.0209]	[0.0187]	[0.0205]	[0.0179]	[0.0219]	[0.0444]
StdColonial ties	0.246***	0.246***	0.251***	0.228***	0.251***	0.262***	0.241***	0.226***
	[0.0121]	[0.0120]	[0.0122]	[0.0122]	[0.0130]	[0.0190]	[0.0108]	[0.0312]
Stdhegemony	-0.00129	0.00219	-0.0207*	-0.0242**	-0.0206*	-0.150***	-0.122***	-0.0149
	[0.0133]	[0.0135]	[0.0121]	[0.0120]	[0.0122]	[0.0222]	[0.0205]	[0.0182]
Constant	5.197***	5.681***	4.289***	4.468***	5.350***	3.577***	3.884***	-19.41***
	[0.401]	[0.607]	[0.211]	[0.162]	[0.190]	[0.195]	[0.195]	[1.147]
Observations	22,635	22,635	20,790	23,165	20,790	18,630	18,858	3,555
R-squared	0.709	0.755	0.846	0.829	0.846	0.916	0.904	0.864
Fixed Effects								
Destination(α_d)	YES	YES	No	No	No	No	No	No
Source(α_s)	YES	YES	YES	YES	YES	YES	YES	YES

Continuation of Table 2.7

Migration flows								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
$Destination - year(\alpha_{dt})$	No	No	YES	YES	YES	YES	YES	YES
$Year(\alpha_t)$	No	YES	No	No	No	No	No	No
Sample	All	All	All	All	All	non-(UK + France)	SSA	5 years

Note: Results in this table are obtained in the same way as in Table 2.2, except that explanatory variables are used in standardized forms here, but not in Table 2.2. For further notes, see Table 2.2.

Table 2.8: Determinants of African migration flows to Europe: Asylum Seekers: standardized variables

Asylum seekers								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
StdLog GDP per capita destination$_{t-1}$	0.253	0.895***						
	[0.170]	[0.288]						
StdLog GDP per capita source$_{t-1}$	-0.268***	-0.201***	-0.207***	-0.235***	-0.163**	-0.284***	-0.209***	-0.591***
	[0.0891]	[0.0746]	[0.0759]	[0.0815]	[0.0773]	[0.0876]	[0.0790]	[0.112]
StdCivil conflict source$_{t-1}$	0.143***	0.163***	0.160***	0.135***	0.165***	0.205***	0.165***	0.189***
	[0.0295]	[0.0225]	[0.0242]	[0.0272]	[0.0239]	[0.0205]	[0.0248]	[0.0548]
StdDemocracy Source$_{t-1}$	-1.880***	-1.534***	-1.847***	-0.985***	1.070***	-2.455***	-1.776***	-1.136***
	[0.203]	[0.117]	[0.167]	[0.111]	[0.122]	[0.157]	[0.124]	[0.266]
StdAutocracy Source$_{t-1}$	-0.179***	-0.0704	-0.0494	-0.0294	-0.0485	-0.0325	-0.0398	-0.0665
	[0.0550]	[0.0652]	[0.0657]	[0.0665]	[0.0648]	[0.0707]	[0.0724]	[0.0942]
StdPolitical rights Source$_{t-1}$	-0.0218	-0.0956*	-0.0853	-0.0736	-0.0880*	-0.0620	-0.0977*	-0.0719
	[0.0510]	[0.0531]	[0.0526]	[0.0562]	[0.0528]	[0.0599]	[0.0522]	[0.0841]
StdCivil liberties Source$_{t-1}$	-0.230***	-0.178***	-0.174***	-0.210***	-0.169***	-0.182***	-0.172***	-0.165**
	[0.0441]	[0.0355]	[0.0386]	[0.0348]	[0.0390]	[0.0446]	[0.0354]	[0.0835]
StdEthnic fractionalization source					1.090***			
					[0.136]			
StdEthnic polarization source	0.844***	0.854***	0.813***		-0.613**	0.621***	0.857***	0.900***
	[0.103]	[0.0930]	[0.0972]		[0.258]	[0.109]	[0.141]	[0.252]

Continuation of Table 2.8

Asylum seekers								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
StdNetwork$_{t-1}$	0.232***	0.167***	0.428***	0.446***	0.434***	0.686***	0.534***	0.380***
	[0.0307]	[0.0261]	[0.0500]	[0.0520]	[0.0527]	[0.0307]	[0.0487]	[0.103]
StdLog Urban Population								
source$_{t-1}$					-1.364***			
					[0.313]			
StdLandlocked source					-1.715***			
					[0.214]			
StdLog Distance	-0.179**	-0.179**	-0.172**	-0.153**	-0.169**	-0.237**	0.0241	-0.198
	[0.0785]	[0.0794]	[0.0754]	[0.0740]	[0.0752]	[0.106]	[0.0995]	[0.169]
StdCommon legislation	0.161***	0.167***	0.151***	0.0944***	0.152***	0.0727**	0.202***	0.187***
	[0.0180]	[0.0175]	[0.0241]	[0.0252]	[0.0238]	[0.0355]	[0.0273]	[0.0487]
StdCommon language	0.254***	0.263***	0.216***	0.218***	0.213***	0.320***	0.232***	0.258***
	[0.0274]	[0.0256]	[0.0251]	[0.0238]	[0.0245]	[0.0222]	[0.0267]	[0.0486]
StdColonial ties	0.0990***	0.104***	0.0908***	0.0858***	0.0923***	0.115***	0.0845***	0.106**
	[0.0111]	[0.0110]	[0.0129]	[0.0125]	[0.0132]	[0.0262]	[0.0116]	[0.0503]
Stdhegemony	-0.0580**	-0.0535**	-0.0764***	-0.0656**	-0.0772***	-0.185***	-0.122***	-0.0896
	[0.0226]	[0.0227]	[0.0259]	[0.0278]	[0.0264]	[0.0456]	[0.0310]	[0.0651]
Constant	3.239***	4.635***	2.824***	4.284***	7.433***	1.772***	2.701***	0.0857
	[0.388]	[0.596]	[0.345]	[0.104]	[0.300]	[0.322]	[0.234]	[0.245]
Observations	22,635	22,635	21,105	23,365	21,105	18,945	19,698	3,555
R-squared	0.284	0.315	0.470	0.459	0.469	0.578	0.503	0.586
Fixed Effects								

Continuation of Table 2.8

Asylum seekers								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
$Destination(\alpha_d)$	YES	YES	No	No	No	No	No	No
$Source(\alpha_s)$	YES	YES	YES	YES	YES	YES	YES	YES
$Destination - year(\alpha_{dt})$	No	No	YES	YES	YES	YES	YES	YES
$Year(\alpha_t)$	No	YES	No	No	No	No	No	No
Sample	All	All	All	All	All	non-(UK + France)	SSA	5 years

Note: Results in this table are obtained in the same way as in Table 2.3, except that explanatory variables are used in standardized forms here, but not in Table 2.3. For further notes, see Table 2.3.

Table 2.9: Determinant of bilateral migration flows: OLS estimation

Log(1+Migration flows)						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS
Log GDP per capita destination$_{t-1}$	0.396***					
	[0.0771]					
Log GDP per capita source$_{t-1}$	-0.0893**	-0.137***				-0.138***
	[0.0352]	[0.0319]				[0.0320]
Civil conflict source$_{t-1}$	0.186***	0.181***	0.194***	0.194***	0.174***	0.182***
	[0.0336]	[0.0306]	[0.0306]	[0.0306]	[0.0377]	[0.0306]
Democracy Source$_{t-1}$	-0.512***	-0.505***	-0.428***	-0.473***	-0.442***	0.318***
	[0.0774]	[0.0737]	[0.0722]	[0.0781]	[0.0830]	[0.0730]
Autocracy Source$_{t-1}$	-0.00394	0.00496	0.00948	0.00948	-0.0245	0.00613
	[0.0349]	[0.0326]	[0.0326]	[0.0326]	[0.0353]	[0.0326]
Political rights Source$_{t-1}$	-0.00543	-0.0114	-0.0255	-0.0255	-0.0533*	-0.0110
	[0.0322]	[0.0294]	[0.0291]	[0.0291]	[0.0317]	[0.0295]
Civil liberties Source$_{t-1}$	-0.0612**	-0.0522*	-0.0491*	-0.0491*	-0.0464	-0.0531*
	[0.0297]	[0.0276]	[0.0276]	[0.0276]	[0.0293]	[0.0277]
Ethnic polarization source	-2.873***	-2.787***	-1.759***		-1.878***	6.151***
	[0.646]	[0.591]	[0.548]		[0.618]	[0.667]
Government stability						
Source$_{t-1}$					0.000900	
					[0.0120]	
Socioeconomic conditions Source$_{t-1}$					-0.0480***	
					[0.0111]	

Continuation of Table 2.9

Log(1+Migration flows)						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS
Control of corruption$_{t-1}$					0.0595***	
					[0.0157]	
Law and order source$_{t-1}$					-0.0735***	
					[0.0189]	
Bureaucracy quality source$_{t-1}$					-0.0148	
					[0.0209]	
Ethnic fractionalization source				0.818***		
				[0.255]		
Log Urban Population source$_{t-1}$						0.0316
						[0.0809]
Landlocked source						-1.117***
						[0.109]
Network$_{t-1}$	0.0719***	0.123***	0.123***	0.123***	0.113***	0.123***
	[0.00210]	[0.00280]	[0.00279]	[0.00279]	[0.00315]	[0.00280]
Log Distance	-0.616***	-0.547***	-0.547***	-0.547***	-0.481***	-0.547***
	[0.0598]	[0.0549]	[0.0549]	[0.0549]	[0.0523]	[0.0549]
Common legislation	0.770***	0.685***	0.686***	0.686***	0.710***	0.685***
	[0.0426]	[0.0408]	[0.0408]	[0.0408]	[0.0434]	[0.0408]
Common language	0.523***	0.465***	0.465***	0.465***	0.520***	0.465***
	[0.0403]	[0.0381]	[0.0381]	[0.0381]	[0.0387]	[0.0381]
Colonial ties	0.654***	0.630***	0.628***	0.628***	1.146***	0.631***
	[0.0919]	[0.0924]	[0.0924]	[0.0924]	[0.154]	[0.0925]
Hegemony	0.333***	0.140	0.140	0.140	0.0611	0.140

Continuation of Table 2.9

Log(1+Migration flows)						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS
	[0.111]	[0.115]	[0.115]	[0.115]	[0.177]	[0.115]
Constant	7.348***	9.787***	8.205***	6.540***	7.986***	4.191***
	[0.961]	[0.681]	[0.584]	[0.536]	[0.600]	[1.090]
Observations	14,125	14,125	14,125	14,125	11,107	14,125
R-squared	0.796	0.830	0.830	0.830	0.843	0.830
Fixed Effects						
$Destination(\alpha_d)$	YES	No	No	No	No	No
$Sours(\alpha_s)$	YES	YES	YES	YES	YES	YES
$Destination-year(\alpha_{dt})$	No	YES	YES	YES	YES	
Year	YES	No	No	No	No	No
Sample	All	All	All	All	All	All

Note: results are obtained by using the OLS estimation method. Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

Table 2.10: Determinant of asylum seeker migration flows: OLS estimation

Log(1+Asylum seekers)						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	(OLS)
Log GDP per capita						
destination$_{t-1}$	0.424***					
	[0.0999]					
Log GDP per capita						
source$_{t-1}$	-0.358***	-0.378***				-0.332***
	[0.0442]	[0.0393]				[0.0393]
Civil conflict source$_{t-1}$	0.363***	0.371***	0.405***	0.405***	0.359***	0.362***
	[0.0390]	[0.0362]	[0.0362]	[0.0362]	[0.0437]	[0.0359]
Democracy Source$_{t-1}$	-2.451***	-2.435***	-2.259***	-2.497***	-2.149***	-0.687***
	[0.0976]	[0.100]	[0.0978]	[0.104]	[0.115]	[0.113]
Autocracy Source$_{t-1}$	-0.0593	-0.0429	-0.0143	-0.0143	-0.110**	-0.0653
	[0.0476]	[0.0429]	[0.0432]	[0.0432]	[0.0471]	[0.0421]
Political rights Source$_{t-1}$	-0.0159	-0.00519	-0.0314	-0.0314	-0.0905**	-0.00597
	[0.0412]	[0.0384]	[0.0383]	[0.0383]	[0.0412]	[0.0384]
Civil liberties Source$_{t-1}$	-0.0864**	-0.0962***	-0.0709**	-0.0709**	-0.0211	-0.0866**
	[0.0372]	[0.0347]	[0.0347]	[0.0347]	[0.0379]	[0.0347]
Ethnic polarization source	-12.94***	-12.52***	-9.294***		-10.03***	6.577***
	[0.924]	[0.876]	[0.824]		[0.890]	[0.998]
Government stability						
Source$_{t-1}$					0.00187	
					[0.0174]	
Socioeconomic conditions Source$_{t-1}$					-0.0645***	

Continuation of Table 2.10

Log(1+Asylum seekers)						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	(OLS)
					[0.0134]	
Control of corruption$_{t-1}$					0.00108	
					[0.0208]	
Law and order source$_{t-1}$					-0.206***	
					[0.0247]	
Bureaucracy quality source$_{t-1}$					-0.107***	
					[0.0296]	
Ethnic fractionalization source				4.321***		
				[0.383]		
Log Urban Population source$_{t-1}$						-1.113***
						[0.125]
Landlocked source						-2.744***
						[0.169]
Network$_{t-1}$	0.0292***	0.0533***	0.0527***	0.0527***	0.0494***	0.0529***
	[0.00216]	[0.00257]	[0.00257]	[0.00257]	[0.00275]	[0.00255]
Log Distance	-0.0208	0.00664	0.00942	0.00942	-0.0328	0.00408
	[0.0589]	[0.0534]	[0.0536]	[0.0536]	[0.0559]	[0.0537]
Common legislation	0.288***	0.264***	0.263***	0.263***	0.168***	0.269***
	[0.0418]	[0.0378]	[0.0378]	[0.0378]	[0.0399]	[0.0376]
Common language	0.522***	0.482***	0.481***	0.481***	0.640***	0.477***
	[0.0432]	[0.0417]	[0.0417]	[0.0417]	[0.0467]	[0.0414]
Colonial ties	0.188**	0.143*	0.145*	0.145*	0.0567	0.145*
	[0.0862]	[0.0862]	[0.0854]	[0.0854]	[0.133]	[0.0850]

Continuation of Table 2.10

Log(1+Asylum seekers)						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	(OLS)
Hegemony	0.412***	0.298***	0.302***	0.302***	0.381***	0.300***
	[0.102]	[0.0998]	[0.0992]	[0.0992]	[0.139]	[0.0988]
Constant	10.34***	12.72***	8.098***	-0.697	9.835***	18.86***
	[1.236]	[0.844]	[0.686]	[0.560]	[0.742]	[1.617]
Observations	12,141	12,141	12,141	12,141	10,167	12,141
R-squared	0.646	0.708	0.706	0.706	0.729	0.710
Fixed Effects						
$Destination(\alpha_d)$	YES	No	No	No	No	No
$Sours(\alpha_s)$	YES	YES	YES	YES	YES	YES
$Destination - year(\alpha_{dt})$	No	YES	YES	YES	YES	YES
Year	YES	No	No	No	No	No
Sample	All	All	All	All	All	All

Note: results are obtained by using the OLS estimation method. Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

Table 2.11: Determinants of African migration to Europe: Adding political variables gradually

Migration flows (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Log GDP per capita								
Source $_{t-1}$	-0.185***	-0.179***	-0.181***	-0.175***	-0.181***	-0.140***	-0.140***	-0.140***
	[0.0399]	[0.0432]	[0.0455]	[0.0472]	[0.0482]	[0.0509]	[0.0509]	[0.0509]
Civil conflict Source $_{t-1}$		0.257***	0.255***	0.255***	0.255***	0.288***	0.288***	0.288***
		[0.0375]	[0.0376]	[0.0356]	[0.0336]	[0.0397]	[0.0397]	[0.0397]
Democracy Source $_{t-1}$		-3.294***	-3.292***	-3.191***	-3.136***	-2.245***	-0.844***	-0.219
		[0.130]	[0.131]	[0.145]	[0.144]	[0.135]	[0.179]	[0.186]
Autocracy Source $_{t-1}$			0.0843**	0.0763**	0.0726**	0.0632*	0.0632*	0.0632*
			[0.0348]	[0.0358]	[0.0362]	[0.0348]	[0.0348]	[0.0348]
Political rights Source $_{t-1}$				-0.113	-0.0821	-0.0970	-0.0970	-0.0970
				[0.0877]	[0.0854]	[0.0787]	[0.0787]	[0.0787]
Civil liberties Source $_{t-1}$					-0.0786**	-0.0610	-0.0610	-0.0610
					[0.0396]	[0.0400]	[0.0400]	[0.0400]
Ethnic polarization Source						2.470***		1.887***
						[0.223]		[0.284]
Ethnic fractionalization Source							3.354***	-0.731**
							[0.224]	[0.305]
Log distance	-0.716***	-0.710***	-0.708***	-0.704***	-0.705***	-0.629***	-0.629***	-0.629***
	[0.0539]	[0.0537]	[0.0535]	[0.0530]	[0.0529]	[0.0565]	[0.0565]	[0.0565]
Common legislation	0.821***	0.825***	0.824***	0.816***	0.816***	0.856***	0.856***	0.856***

Continuation of Table 2.11

Migration flows (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
	[0.0625]	[0.0622]	[0.0618]	[0.0598]	[0.0596]	[0.0668]	[0.0668]	[0.0668]
Common language	0.302***	0.301***	0.303***	0.305***	0.304***	0.521***	0.521***	0.521***
	[0.0567]	[0.0556]	[0.0554]	[0.0551]	[0.0553]	[0.0617]	[0.0617]	[0.0617]
Colonial ties	1.037***	1.032***	1.028***	1.022***	1.024***	1.129***	1.129***	1.129***
	[0.0539]	[0.0536]	[0.0538]	[0.0554]	[0.0549]	[0.0546]	[0.0546]	[0.0546]
Network_{t-1}	0.0719***	0.0716***	0.0718***	0.0727***	0.0727***	0.0726***	0.0726***	0.0726***
	[0.0122]	[0.0121]	[0.0122]	[0.0123]	[0.0123]	[0.0124]	[0.0124]	[0.0124]
Hegemony	-0.116**	-0.112**	-0.112*	-0.114**	-0.115**	-0.0981*	-0.0981*	-0.0981*
	[0.0555]	[0.0567]	[0.0573]	[0.0566]	[0.0568]	[0.0575]	[0.0575]	[0.0575]
Constant	7.095***	12.18***	12.20***	12.11***	12.18***	9.766***	2.323***	4.532***
	[0.553]	[0.618]	[0.620]	[0.630]	[0.638]	[0.594]	[0.722]	[0.647]
Observations	23,180	23,165	23,165	23,165	23,165	20,790	20,790	20,790
R-squared	0.826	0.826	0.827	0.829	0.829	0.846	0.846	0.846
Destination	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sours	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	All	All	All	All	All	All	All

Note: Results in this table are obtained adding political variable gradually. Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

Table 2.12: Determinants the flow of African asylem seekers in Europe: Adding political variables gradually

Asylum seekers (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Log GDP per capita								
Source$_{t-1}$	-0.273***	-0.229***	-0.231***	-0.203***	-0.202***	-0.177***	-0.177***	-0.177***
	[0.0631]	[0.0651]	[0.0666]	[0.0650]	[0.0700]	[0.0652]	[0.0652]	[0.0652]
Civil conflict Source$_{t-1}$		0.359***	0.361***	0.353***	0.330***	0.393***	0.393***	0.393***
		[0.0713]	[0.0748]	[0.0736]	[0.0667]	[0.0594]	[0.0594]	[0.0594]
Democracy Source$_{t-1}$		-2.069***	-2.076***	-5.483***	-1.973***	-3.700***	-1.206***	-1.891***
		[0.207]	[0.216]	[0.241]	[0.222]	[0.334]	[0.186]	[0.192]
Autocracy Source$_{t-1}$			0.0469	-0.0206	-0.0671	-0.113	-0.113	-0.113
			[0.127]	[0.148]	[0.152]	[0.150]	[0.150]	[0.150]
Political rights Source$_{t-1}$				-0.321***	-0.151	-0.175	-0.175	-0.175
				[0.122]	[0.115]	[0.108]	[0.108]	[0.108]
Civil liberties Source$_{t-1}$					-0.421***	-0.348***	-0.348***	-0.348***
					[0.0698]	[0.0773]	[0.0773]	[0.0773]
Ethnic polarization Source						3.882***		-2.255***
						[0.464]		[0.422]
Ethnic fractionalization Source							5.676***	3.317***
							[0.487]	[0.330]
Log distance	-0.374**	-0.364**	-0.363**	-0.355**	-0.349**	-0.390**	-0.390**	-0.390**
	[0.165]	[0.168]	[0.170]	[0.169]	[0.168]	[0.171]	[0.171]	[0.171]
Common legislation	0.218***	0.223***	0.222***	0.213***	0.209***	0.336***	0.336***	0.336***
	[0.0565]	[0.0558]	[0.0569]	[0.0560]	[0.0558]	[0.0534]	[0.0534]	[0.0534]

Continuation of Table 2.12

Asylum seekers (in level)								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Common language	0.642***	0.647***	0.648***	0.649***	0.642***	0.636***	0.636***	0.636***
	[0.0669]	[0.0670]	[0.0686]	[0.0693]	[0.0701]	[0.0740]	[0.0740]	[0.0740]
Colonial ties	0.374***	0.381***	0.377***	0.381***	0.385***	0.408***	0.408***	0.408***
	[0.0564]	[0.0551]	[0.0573]	[0.0576]	[0.0561]	[0.0582]	[0.0582]	[0.0582]
Network_{t-1}	0.0634***	0.0626***	0.0628***	0.0639***	0.0644***	0.0619***	0.0619***	0.0619***
	[0.00760]	[0.00752]	[0.00762]	[0.00765]	[0.00752]	[0.00723]	[0.00723]	[0.00723]
Hegemony	-0.292**	-0.293**	-0.292**	-0.302**	-0.311**	-0.362***	-0.362***	-0.362***
	[0.133]	[0.133]	[0.133]	[0.131]	[0.132]	[0.123]	[0.123]	[0.123]
Constant	10.09***	9.635***	9.617***	9.346***	9.388***	6.946***	4.597***	7.786***
	[1.466]	[1.476]	[1.486]	[1.530]	[1.387]	[1.321]	[1.573]	[1.459]
Observations	23,380	23,365	23,365	23,365	23,365	21,105	21,105	21,105
R-squared	0.440	0.450	0.451	0.456	0.459	0.470	0.470	0.470
Destination	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sours	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	All	All	All	All	All	All	All

Note: Results in this table are obtained adding political variable gradually. Standard errors in parenthesis are heteroskedasticity robust and clustered by year. Significance at the 1%, 5% and 10% level is indicated by ***, **, and *, respectively.

Chapter 3

The Joint Impact of Infrastructure and Institutions on Economic Growth

Overview. This chapter examines the joint impact of infrastructure capital and institutional quality on economic growth using a large panel dataset covering 120 countries and spanning the years 1980−2015. The empirical strategy involves estimating a simple growth model where, in addition to standard controls, infrastructure, institutional quality and their interaction are included as explanatory variables. Potential endogeneity concerns are addressed by means of Generalised Method of Moments (GMM) estimators that utilize internal instruments. We find that the interaction terms between infrastructure capital and in-

stitutional quality have a positive and significant impact on economic growth. These results are robust to a variety of alternative specifications and institutional quality measures. Hence, our results suggest that maximizing returns from infrastructure development requires improving the quality of institutions.

Keywords: infrastructure; institutions; growth; dynamic panel

3.1 Introduction

Physical infrastructure assets such as roads, electrical grid, telecommunication networks, water supply, and waste disposal provide services are central to the functioning of modern economies (Palei, 2015). Beyond being one of the most essential inputs in the process of economic growth, the supply of efficient public infrastructure improves quality of life as well as being critical for national security (Baldwin and Dixon, 2008). As a consequence of sustained economic development, population pressure and rapid advances in science and technology in the past century, infrastructure capital has become highly diverse and broadly tuned meaning that improving the quality and quantity of infrastructure capital as a vital factor of production has become an integral part of sustainable development policies.

A significant body of academic literature has focused on the contributions of infrastructure capital to aggregate output, productivity and welfare. Often, such studies discuss these contributions in terms

of the growth effects of productive government spending models (see, for instance, Barro, 1990; Glomm and Ravikumar, 1997; Ghosh and Roy, 2004). Moreover, following the seminal work of Aschauer (1989), a growing interest in empirically investigating the link between infrastructure capital and economic growth has been observed. (see, e.g., Canning and Pedroni, 1999; Bougheas et al., 2000; Röller and Waverman, 2001; Calderón and Servén, 2004; Calderón et al., 2015). Despite using a variety of datasets and empirical methodologies, most of these empirical studies document a generally positive correlation and long-run effect of physical infrastructure on aggregate output and productivity (Munnell et al., 1990; Fernald, 1999; Calderón and Servén, 2004; Fedderke et al., 2006; Torrisi, 2010).

Similar to infrastructure capital, the role of institutional quality as a determinant of economic performance has also received increasing attention in empirical growth studies conducted in the past three decades (see, among others, North, 1991; Coase, 1992; Ostrom et al., 1993; Rodrik, 2003). These studies have served to convincingly demonstrate that general differences in institutional quality are serves as one of the most reliable determinants of variations in economic development among countries (Rodrik et al., 2004; Acemoglu et al., 2005; Acemoglu et al., 2008; Lee and Kim, 2009; Valeriani et al., 2011; Acemoglu and Robinson, 2013; Law et al., 2013). More particularly, the protection of civil and property rights, economic and political freedom, law and order, bureaucratic quality and low levels of corruption have been shown to be associated with higher rates of economic growth (Bénassy-Quéré

et al., 2007).

While large bodies of empirical literature have examined the separate roles of infrastructure capital and institutional quality in economic development, existing cross-country studies pay surprisingly little attention to the complementarities between infrastructural and institutional capability as it relates to their effects on economic growth. The few exceptions to this generalization include Esfahani and Ramırez (2003), Maiorano and Stern (2007) and Andonova and Diaz-Serrano (2009). Using a cross-country study and a structural model of infrastructure, Esfahani and Ramırez (2003) document the crucial role of generic institutional capabilities as an indicator of the credibility and effectiveness of government's toward enabling high infrastructure returns. However, these authors employed pure cross-sectional regressions that are known to suffer from endogeneity biases. Another study, conducted by Maiorano and Stern (2007) find that regulatory institutions have a positive effect on mobile telecommunication infrastructure and on the levels of per capita GDP. Despite using narrow measures of infrastructure capital and institutional quality, the study by Maiorano and Stern (2007) suggests a potentially positive joint impact of infrastructure and institutions on economic growth. A similar study by Andonova and Diaz-Serrano (2009) also serves to demonstrate that while political institutions are essential to the development of telecommunications infrastructure, their effect is limited, as mobile technologies are less dependent on political constraints. Conversely, bad institutions are often considered to be behind the weak economic performances of

infrastructural projects, particularly in developing economies (Aron, 2000; Chang, 2011). Among other indicators, a lower quality of infrastructure is associated with corruption across a range of economies (Tanzi and Davoodi, 1998; Dal Bó and Rossi, 2007; Gillanders, 2014; Corrado and Rossetti, 2018). In addition, when governments are weak in regard to implementing infrastructural investments, or when they apply excessive interventions, potential gains from infrastructure investments might be suppressed or appropriated (Straub, 2011).

The present study aims to reassess the role of infrastructure capital in economic growth under varying degrees of institutional quality.[1] In this context, while infrastructure capital is considered as a physical core, institutional quality can be viewed as a soft component in shaping growth patterns.[2] Hence, the first contribution of this chapter is to revisit the joint impact of infrastructure capital and institutional quality using a new dataset that consists of several alternative measures for both variables. We employ a balanced dataset of 120 countries spanning the period 1980–2015.

The second contribution of this chapter concerns the estimation methodology. Empirical growth models often include lagged dependent variables as a covariate to control for the convergence effect. This creates an endogeneity problem, as the lagged dependent variable will

[1] In this chapter we consider the basic physical capital stocks, using electric power generation and telecommunication subscriptions as proxies for infrastructure assets.

[2] In our model, infrastructure capital is taken as a crucial treatment variable, while institutional quality is a moderator.

be–by construction–correlated with the unobserved country-specific effects (Caselli et al., 1996). Earlier studies on institutions and infrastructure, such as Esfahani and Ramırez (2003) and Law et al. (2013), use cross-sectional regressions and apply an instrumental variable approach to address the endogeneity problem. However, implementing an instrumental variables estimation approach is often challenging as it is difficult to find a reliable instrumental variable for infrastructure capital and institutional quality (Lee and Kim, 2009). Our second contribution is thus to provide more reliable results by addressing the endogeneity problem through the system Generalised Method of Moments (system-GMM) estimator (Arellano and Bover (1995); Blundell and Bond (1998); Bond et al. (2001)). This estimator is well suited to account for the potential endogeneity of not only the lagged dependent variable, but also of other explanatory variables.

As a third contribution, this chapter improves upon extant studies on the joint effects of infrastructure and institutions, such as Esfahani and Ramırez (2003), Maiorano and Stern (2007) and Andonova and Diaz-Serrano (2009), by employing a large spectrum of institutional quality indicators, including democracy, autocracy, executive constraints, and bureaucratic quality, government stability, control over corruption, and the rule of law. These indicators capture three different dimensions of political institutions: political stability, administrative quality and democratic accountability. With these contributions in mind this study seeks to help better understand the extent to which the effects of infrastructure capital on economic growth are

affected with respect to varying institutional qualities. This will, for instance, allow us to check whether promoting democracy is more important than controlling corruption in enhancing the productivity of infrastructural projects.

Our results reveal that infrastructure capital is positively and significantly correlated with economic growth in countries with higher institutional qualities, and vice versa. In particular, infrastructure capital affects economic growth positively and significantly in the presence of considerably better institutional frameworks such as democracy, law and order, control of corruption, bureaucratic qualities and government stability. On the contrary, weaker institutional setups, such as autocracy, diminish the growth impacts of infrastructure capital. Our results are robust to the use of various alternative specifications and estimation methods. These results suggest that improving the quality of institutions is essential to reap the full economic benefits of infrastructural investments.

The rest of the chapter is organized as follows. Section 3.2 introduces the empirical specification of our model. Section 3.3 describes our data in detail. Section 3.4 provides the results and Section 3.5 contains the conclusion. Finally, section 3.6 provides supplementary material.

3.2 Empirical Model Specification

In our quest to examine the role of infrastructure capital on economic growth under varying degrees of institutional quality (henceforth we use the word "institutions" and "institutional quality" alternatively), we employ theoretical models that link economic growth with rent-seeking models. Specifically, our model builds up on the endogenous growth model of Barro (1990), which incorporates infrastructure capital as one factor of production. It bears noting here that infrastructural investments are highly vulnerable to substantial bribes and rent-seeking activities (Shleifer and Vishny, 1993). Hence, weak institutional setups may lead to lower quality of infrastructural investments and hence slow the rate of economic growth (Knack and Keefer, 1995; Mauro, 1997). Alternatively, institutional quality is expected to have a direct effect on growth because it affects the efficiency of infrastructural investments. This view is echoed by, among others, Chong and Gradstein (2007), who argue that weak institutions divert resources from productive to unproductive sectors and encourage rent-seeking behaviors.

Our empirical model is derived from Canning and Pedroni (2008), who, following Barro (1990), incorporate stochastic disturbance terms over time. Such an approach allows us to estimate the role of infrastructure capital in a reduced form growth model using panel data estimation techniques. Specifically, our theoretical model describes the long-run growth rate of output per capita as a function of infrastruc-

ture capital and institutions.[3] Formally, our model, after a logarithmic transformation, is written as

$$\dot{y_{it}} = \alpha + \theta G_{it} + \gamma I_{it} + \sigma I_{it} * G_{it}, \tag{3.1}$$

where $\dot{y_{it}}$ denotes the GDP per capita growth rate for country i at time period t, I_{it} represents an indicator of institutional quality, G_{it} stands for infrastructural capital, and $I_{it} * G_{it}$ is the interaction term between institutions and infrastructure.

Our empirical model follows from (3.1) and looks as follows:

$$\dot{y}_{it} = \alpha + \theta G_{it} + \gamma I_{it} + \sigma I_{it} * G_{it} + \lambda Z_{it} + \epsilon_{it}, \tag{3.2}$$

where Z_{it} is a vector of control variables and ϵ_{it} is the error term. In this model the marginal effect (ME) of G_{it} on $\dot{y}_{it}$ is given by:

$$ME(G_{it} \mid I_{it}) = \frac{\partial \dot{y}_{it}}{\partial G_{it}} = \theta + \sigma I_{it} \tag{3.3}$$

In (3.3) unless σ is zero, the marginal effect of G_{it} is conditional on the value of I_{it}. Since we have a symmetric interactive model specification in (3.2), the marginal effect of I_{it} on $\dot{y}_{it}$ is also conditional on G_{it}, i.e.,

$$ME(I_{it} \mid G_{it}) = \frac{\partial \dot{y}_{it}}{\partial I_{it}} = \gamma + \sigma G_{it}. \tag{3.4}$$

[3]Subsection 3.6.1, in the Appendix, provides a detailed theoretical discussion of the model.

Thus, the coefficient of the interaction term, σ, indicates both the slope of the relationship between $ME(G_{it} \mid I_{it})$ and I_{it}, and the slope of the relationship between $ME(I_{it} \mid G_{it})$ and G_{it} (Berry et al., 2012). Therefore, we propose the following hypothesis:

$\mathbf{H_{Infrastructure|Institutions}}$: The marginal effect of infrastructure capital on economic growth is expected to be positive in the presence of a high level of institutional quality, and this positive effect is expected to strengthen as the institutional quality improves. Similarly, the marginal effect of institutional quality is expected to be positive at any non-zero level of infrastructure capital and the effect gets stronger as infrastructure capital increases.

3.2.1 Dynamic panel data estimation approach

The empirical growth literature on the effects of infrastructure capital and institutional quality on economic growth has relied heavily on pure cross-sectional estimation methods (see, e.g., Esfahani and Ramırez, 2003; Glaeser et al., 2004; and, Rodrik et al., 2004). Nonetheless, the pure cross-sectional estimations often suffer from endogeneity bias, which arises by construction from the correlation between unobserved country-specific effects and the lagged dependent variable (Caselli et al., 1996). Furthermore, reverse causality from determinants of growth, such as infrastructure capital and institutional quality, to economic growth could be another source of endogeneity and could bias estimation results. To overcome these endogeneity concerns, an

instrumental variable approach could be employed. Nevertheless, it is often difficult to find reliable instruments, which can be associated with the explanatory variable, but not with the error term.

In the empirical growth literature, the General Method of Moments (GMM)-based dynamic panel data estimators suggested by Arellano and Bond (1991); Arellano and Bover (1995); and Blundell and Bond (1998) are widely used to overcome the aforementioned econometric challenges in pure cross-sectional growth regressions. It is noteworthy that these estimators address unobserved country heterogeneity, omitted variable bias, and potential endogeneity that could arise from reverse-causality, by removing country-specific effects through first-differencing and employing lagged values as internal instruments (Arellano and Bover, 1995; Blundell and Bond, 1998).

In this study, we employ the system-GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) to examine the effects of infrastructure capital and institutional quality on aggregate output. We employ a panel data set of 120 countries over the period $1980-2014$, with data averaged over five-years periods to overcome business cycle effects. Our baseline model is a multiplicative interaction model, which is derived from (3.2):

$$\dot{y}_{it} = \alpha+\beta\dot{y}_{it-1}+\theta INFR_{it}+\gamma INST_{it}+\sigma INST^{*}_{it}INFR_{it}+\lambda Z_{it}+\mu_i+\upsilon_{it} \tag{3.5}$$

where y_{it-1} is log GDP per capita of the previous five-year period

and μ_i denotes the unobserved country-specific fixed effect. In (3.5) the interaction term allows the marginal effect of infrastructure capital on economic growth to vary with different degrees of institutional quality.

Unlike the difference-GMM estimator (Arellano and Bond, 1991), which employs equations in first differences, the system-GMM estimator uses a system of two equations: one in first differences and the other in levels. The variables in levels in the latter are instrumented with their first differences, and these additional instruments reduce small sample biases and imprecision associated with the difference-GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998; Roodman, 2006).

To test if our model is correctly specified, we apply two tests, namely the overidentification test, and the test for deeper lag serial correlation of the residuals in the differenced equation. Under the null hypothesis of instrument validity, the Sargan/Hansen tests for over-identifying restrictions are asymptotically distributed as a Chi-squared random variable with degrees of freedom equal to the number of instruments less the number of parameters. The autocorrelation test determines the presence of autocorrelation of order three in the residuals in first differences, which is equivalent to testing autocorrelation of order two in the residuals in levels.

3.3 Data Description

As stated above, our goal in this chapter is to estimate the effect of infrastructure capital, institutional quality and their interaction on aggregate economic growth worldwide. To this end we employ a balanced panel dataset that covers 120 countries over the period $1980 - 2015$. The list of the sample countries covered by the study is provided in Table 3.8. The variables used in the model and the source of data are briefly discussed below while summary statistics are documented in 3.1.

The dependent variable is the growth rate of aggregate output of a country. Aggregate output is measured by gross domestic product (GDP) per capita in constant 2010 US dollars. The data are obtained from the World Bank Development Indicators database (World-Bank, 2017).

One of the main challenges associated with research on infrastructure and growth is obtaining quality national-level data on infrastructure capital. Sector-specific physical infrastructure data on investment or capital stock volumes are available only for a handful of high-income economies, and usually for just a few years. As a result of the incomplete nature of the data for other sectors of infrastructural investments, such as road networks, airports, and irrigation, we have opted here to focus on telephone and power production infrastructure.

Accordingly, we use fixed telephone subscriptions per 100 people

and the aggregate electric power generation kilowatt-hours (kWh) per capita as proxies for infrastructure capital investment. As a particular merit of these indicators, telephone networks and electric power generation are major contentious issues in the political economy of infrastructure development in many countries, and their productivity could be strongly influenced by the quality of prevailing institutions (Esfahani and Ramırez, 2003).

Fixed telephone subscriptions refer to the sum of an active number of analog fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones. Alternatively we use the telephone data from the Cross-National Time-Series Data Archive (CNTS) (Banks, 2011), which consolidates fixed line and cellular telephones.

Our data on electric power generation comes from the U.S.-Energy-Information-Administration (2017), which provides access to a wide range of global energy and climate statistics. The dataset provides electricity generation by energy sources such as oil, nuclear, hydroelectric, gas, coal, and others. For this study, we use the aggregated data from all sources in kWh for each country, divided by the total population of the country.

To measure institutional quality, we rely on two primary sources. First, we use the political institution indicators from the Polity IV Project dataset (Marshall and Jaggers, 2002). Second, we employ the political risk index of the International Country Risk Guide (ICRG)

dataset, which provides survey-based data on the rule of law, control of corruption, bureaucratic quality, and government stability (Howell, 2011). A brief description of the individual institutional quality indicators used in the current study is provided below:

- **Polity2**: This is a combination of institutionalized democracy and institutionalized autocracy. The Polity2 score, which is derived from the Polity IV Dataset (Marshall and Jaggers, 2002), is computed by subtracting the autocracy score from the democracy score. The resulting unified Polity2 scale ranges from +10 (strongly democratic) to -10 (strongly autocratic).

- **Executive constraints**: This refers to the extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectives, where any "accountability group may impose such limitations." This variable, which is also from the Polity IV Dataset, ranges from one to seven, wherein the larger the value, the larger the degree of constraints on the executive.

- **Institutionalized democracy**: This measure covers three aspects: (*i*) the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders; (*ii*) the existence of institutionalized constraints on the exercise of power by the executive; and (*iii*) the guarantee of civil liberties to all citizens in their daily lives and acts of political participation. This variable, which is drawn from

the Polity IV Dataset, ranges from zero to ten, wherein the larger the value, the larger the degree of institutionalized democracy.

- **Institutionalized autocracy**: This measure defines the presence of a distinctive set of political characteristics including: (*i*) the competitiveness of political participation; (*ii*) the regulation of political participation; (*iii*) the openness and competitiveness of executive recruitment; and (*iv*) constraints on the chief executive. This variable, which is also taken from the Polity IV Dataset, ranges from zero to ten, wherein the larger the value, the larger the degree of institutionalized autocracy.

- **Bureaucracy quality**: This index measures the degree to which the bureaucracy minimizes policy revisions when governments change. Therefore, this measure of shock absorption takes on larger points for countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. In these low-risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruitment and training and it ranges from zero to four, wherein the larger the value, the lower the risk. The related data come from the International Country Risk Guide (Howell, 2011).

- **Rule of law**: This index, which is taken from the International Country Risk Guide (Howell, 2011), measures the strength and impartiality of the legal system. It ranges from zero to six,

wherein the larger the value, the lower the risk.

- **Control of corruption**: This index (which comes from the International Country Risk Guide (Howell, 2011) measures potential corruption in the form of excessive patronage, nepotism, job reservations, "scratching each other's back", secret party funding, and suspiciously close ties between politics and infrastructure capital. It ranges from zero to six, wherein the larger the value, the lower the control of corruption.[4]

- **Government stability**: This indicator is meant to assess both the government's ability to carry out its declared program(s), and its ability to stay in office. We use data from the International Country Risk Guide (Howell, 2011). The risk rating assigned is the sum of three sub-components: government unity, legislative strength, and popular support. Each of these items ranges from zero to twelve, wherein the larger the value, the lower the risk.

In line with the empirical growth literature (see, for instance, Mankiw et al., 1992; Barro and Lee, 1996; Sala-i Martin, 1997; Nawaz, 2015), we use a vector of control variables including human capital, trade openness, macroeconomic stability and growth rate of population in the

[4]The largest risk of corruption is that at some point it will become so overweening (or some major scandal will be suddenly revealed) as to provoke a popular backlash, resulting in a fall or overthrow of the government, a major reorganization or restructuring of the country's political institutions, or, at worst, a breakdown in law and order, rendering the country ungovernable. Contract repudiation indicates the risk of a modification in a contract taking the form of repudiation, postponement, or scaling down due to budget cutbacks, indigenization pressure, a change in government, or a change in government's economic and social policies.

estimated equations. The data for all these control variables, except the educational attainment, are obtained from the World Development Indicators (World-Bank, 2017). The data on educational attainment are drawn from Barro and Lee (2013).

Educational attainment is measured using average years of schooling of males and females above 25 years of age. Annual population growth rate for year t is the exponential rate of growth of midyear population from year $t-1$ to t, expressed as a percentage. The trade openness of the sample countries is computed as the sum of imports and exports of goods and services as a percentage of GDP.

Table 3.1: Summary statistics of variables used in estimation

Variables	Number of observation	Mean	Standard deviation	Minimum	Maximum
Log of GDP per capita	4,356	8.240	1.568	4.880	11.63
Log of all telephone per capita	4,356	10.08	2.162	4.248	15.31
Log of trade openness	4,356	22.26	3.047	2.797	28.56
Log of population growth rate	4,356	1.204	0.647	-2.522	2.766
Log of financial development	4,212	3.326	1.071	-1.514	7.688
Log of telephone subscriptions	4,356	1.479	1.945	-5.096	4.314
Log of electric kWh production per capita	4,248	7.426	2.325	0.527	21.59
Log of years of secondary education	824	1.226	0.651	0.029	2.629
Log of years of tertiary education	824	0.280	0.309	0	1.330
Democracy	4,032	5.210	4.053	0	10
Autocracy	4,032	2.185	3.049	0	10
Polity2	4,032	3.035	6.807	-10	10
Executive constraints	4,032	4.652	2.272	0	7
Government stability	3,636	7.388	2.246	1	12
Control of corruption	3,635	3.194	1.485	0	11
Rule of law	3,635	3.618	1.571	0	6
Bureaucratic quality	3,636	2.266	1.233	0	4
Polity2 X telephone	4,032	12.17	16.85	-28.41	43.14
Democracy X telephone	4,032	12.50	15.72	-30.58	43.14
Autocracy X telephone	4,032	0.348	6.131	-27.96	28.41
Executive constraints X telephone	4,032	9.287	11.44	-25.48	30.20
Control of Corruption X telephone	3,635	6.600	8.456	-15.27	39.15
Rule of law X telephone	3,635	7.562	9.307	-12.22	25.89
Bureaucratic quality X telephone	3,636	5.226	6.239	-10.69	17.26
Government stability X telephone	3,636	12.84	15.66	-45.87	46.70
Polity2 X electricity	3,924	28.68	54.83	-135.2	119.9
Democracy X electricity	3,924	42.86	37.30	0	119.9
Autocracy X electricity	3,924	14.24	22.53	0	135.2
Executive constraint X electricity	3,924	36.89	22.84	0	104.6
Corruption X electricity	3,599	25.58	16.24	0	100.8
Rule of law X electricity	3,599	28.93	17.45	0	71.94
Bureaucratic quality X electricity	3,600	18.69	12.80	0	47.96
Government stability X electricity	3,600	56.54	23.16	3.88	119.20

3.4 Results

In this section we discuss estimation results of our empirical growth models, where infrastructure, institutional quality and the interaction of the two are our variables of interest. In particular, we first run Ordinary Least Squares (OLS) regressions to explore the relationship between economic growth and its determinants. Furthermore, we use the fixed-effect (FE) model in order to exploit the panel dimension of the data and tackle the cross-sectional heterogeneity. To overcome the endogeneity problems associated with the dynamic nature of growth models, we use the system-GMM estimator (Arellano and Bond, 1991; Blundell and Bond, 1998).

3.4.1 Pooled OLS and Fixed Effect Estimations

Table 3.2 presents pooled OLS estimation results using annual economic growth as a dependent variable and infrastructure and institutional quality and their interactions as covariates of interest. In each column, we include time dummies to account for time-effects. In all the specifications, interaction terms between infrastructure and institutions are included. In particular, while columns 1, 2 and 3 consist of the interaction between fixed telephone subscriptions per 100 people (hereinafter telephone) and Polity2, columns 4, 5 and 6 include the interaction terms between electric power generation in kWh per capita (hereinafter electricity) and Polity2. In columns 2 and 5, we control for population growth rate. In column 3 and 6, we add more growth determinants that are standard in the growth literature.

Table 3.2: OLS Estimation

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Log of telephone	6.872***	7.163***	0.939**			
	[0.0939]	[0.105]	[0.360]			
Polity2	-0.293***	-0.290***	-0.0638**	-2.145***	-1.986***	-0.918***
	[0.0248]	[0.0247]	[0.0247]	[0.121]	[0.123]	[0.0737]
Polity2 X telephone	0.223***	0.247***	0.0414**			
	[0.0103]	[0.0103]	[0.0194]			
Polity2 X electricity				0.369***	0.336***	0.150***
				[0.0173]	[0.0177]	[0.0108]
Log of electricity				4.068***	3.875***	1.335***
				[0.175]	[0.186]	[0.108]
Log of trade openness			2.649***			1.839***
			[0.431]			[0.0960]
Log of financial development			0.457*			2.274***
			[0.232]			[0.147]

Continuation of Table 3.2

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Log of population growth rate		2.100***	0.0595		-2.607***	-0.0594
		[0.224]	[0.179]		[0.422]	[0.235]
Constant	74.18***	70.97***	21.20**	48.70***	53.83***	12.32***
	[0.578]	[0.665]	[9.122]	[1.399]	[1.749]	[1.866]
Observations	3,996	3,996	3,564	3,924	3,924	3,492
R-squared	0.848	0.852	0.722	0.704	0.711	0.863
Year	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table documents the pooled OLS regressions results. All specifications consist of GDP per capita growth rate as a dependent variable and it is regressed on time fixed effects, telephone, Polity2, the interaction between Polity2 and telephone, the ratio total credit to the private sector to GDP (financial development), trade openness, population growth rate, electricity, and the interaction between Polity2 and electricity. All the explanatory variables, except Polity2, are used in natural logarithmic forms. Standard errors in parenthesis are heteroskedasticity robust. Significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively.

The results reveal that the interaction terms have the expected positive sign throughout the specifications. These results are consistent with our hypothesis that the marginal productivity of infrastructure capital tends to be larger with better institutional quality. However, these results should be taken with some caution as OLS in pooled regressions neither addresses individual heterogeneity nor solves the endogeneity of explanatory variables.

Figure 3.1 and 3.2 plot the marginal effect of infrastructure capital on economic growth across the observed ranges of Polity2 based on the estimates of column 3 and 6 of Table 3.2, respectively. They show that the correlation between infrastructure capital and economic growth is positive and statistically significant at the 95% confidence interval across all levels of institutional quality. The converse result that the marginal effect of institutional quality (Polity2) on economic growth depends positively on telephone and electricity is shown by Figures 3.3 and 3.4 in Subsection 3.6.2 in the Appendix.

To avoid the possibility of modeling business cycle fluctuations, we now exploit the time variation of the sample by splitting our 35 years of data into 7 non-overlapping 5-year periods. Table 3.3, which is structured similarly to Table 3.2, presents results for panel fixed-effect regressions, and it includes the lag of GDP per capita as explonatory variable.

Using five-year averages of annual economic growth as the dependent variable, we examine the effects of infrastructure and institutions

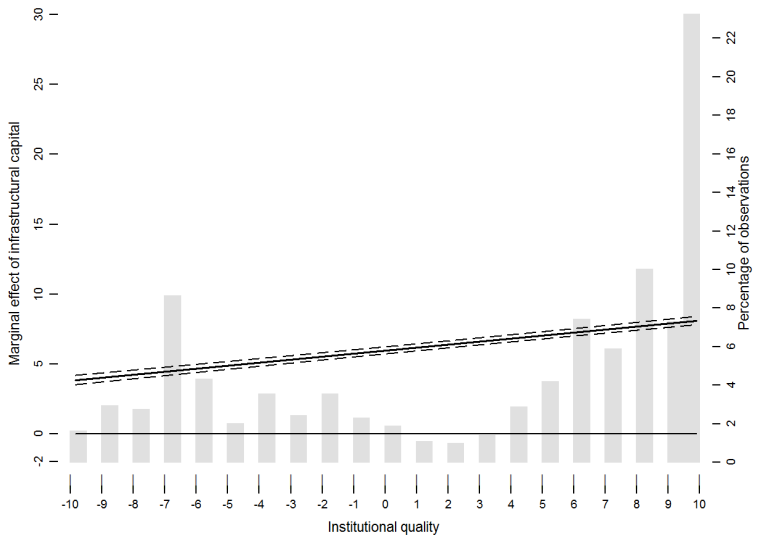

Figure 3.1: The effect of Polity2 on the marginal effects of telephone infrastructure on economic growth. The graph is is derived from the OLS regression results documented in column 3 of Table 3.2.

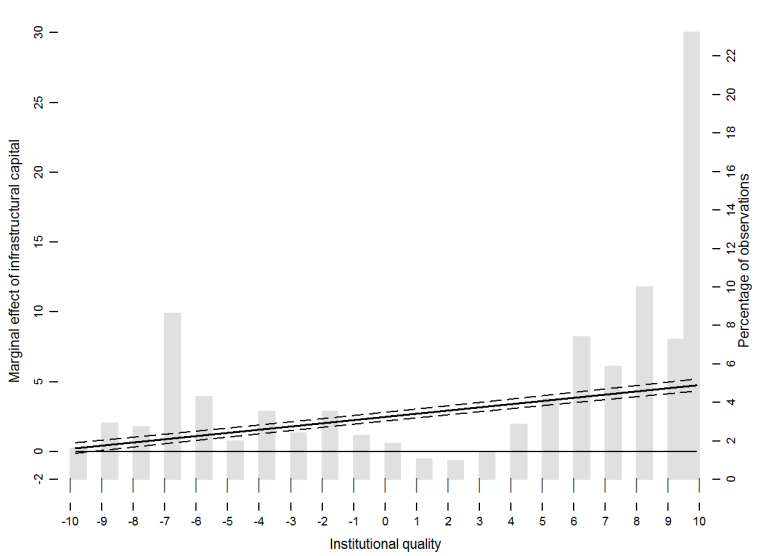

Figure 3.2: The effect of Polity2 on the marginal effects of electric power infrastructure on economic growth. The graph is derived from the OLS regression results documented in column 6 of Table 3.2.

by means of the within estimator. As control variables, Table 3.3 additionally includes average years of secondary education in columns 2 and 5, and tertiary education in columns 3 and 6, respectively. Throughout the specifications, the results indicate that the coefficients on the interaction between infrastructure and institutions are positive and statistically significant, at least at the 10% significance level.

In Table 3.3, the effects of education on growth are not statistically significant and are negative in some cases. These results may be explained by noting that institutions and education are strongly correlated (see, for instance, Glaeser et al., 2004 and Bhattacharyya, 2009). One can argue that a high correlation between the two predictors may induce multicollinearity, making it difficult to disentangle separate effects. This result might also be interpreted from the point of view of heterogeneity (Flachaire et al., 2014), since education and institutions could have different effects on growth for different groups of countries. Nevertheless, there are some cases where average years of tertiary education is positive and highly significant.

In general, the results in Table 3.3 provide strong support for the hypothesis that infrastructure capital is positively correlated with economic growth given high-quality political institutions. Nonetheless, these results should be interpreted with some care as the fixed effect estimator suffers from endogeneity problems that arise from the correlation between the lagged dependent variable and the country-specific fixed effects.

Table 3.3: Panel fixed effects estimation results

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Log of GDP per capita_t-1	-0.492***	-0.548***	-0.663***	-0.500***	-0.536***	-0.659***
	[0.0474]	[0.0551]	[0.0346]	[0.0422]	[0.0508]	[0.0418]
Log of telephone	1.263***	1.470***	0.960***			
	[0.390]	[0.410]	[0.289]			
Polity2	-0.0555*	-0.0323	-0.0331	-0.223***	-0.176**	-0.186***
	[0.0322]	[0.0313]	[0.0233]	[0.0806]	[0.0761]	[0.0603]
Polity2 X telephone	0.0493**	0.0385*	0.0316*			
	[0.0210]	[0.0205]	[0.0166]			
Polity2 X electricity				0.0302**	0.0248**	0.0258**
				[0.0124]	[0.0117]	[0.0100]
Log of electricity				1.508***	1.578***	0.778**
				[0.454]	[0.456]	[0.303]
Log of average years						
of secondary education	-0.139			0.278		
	[0.742]			[0.846]		
Log of average years						
of tertiary education		4.018***	2.045**		2.710**	1.174
		[1.111]	[0.983]		[1.176]	[0.995]
Log of trade openness			2.289***			2.519***
			[0.348]			[0.386]
Log of financial development			0.454**			0.433**

Continuation of Table 3.3

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
			[0.185]			[0.213]
Log of population growth rate			0.223			0.00344
			[0.189]			[0.221]
Constant	39.98***	42.36***	-2.488	30.83***	32.62***	-11.83
	[3.787]	[4.208]	[8.113]	[4.031]	[4.661]	[9.516]
Observations	693	693	679	679	679	665
R-squared	0.507	0.531	0.695	0.482	0.493	0.682
Number of countries	99	99	97	97	97	95
Year	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports results of a set of panel regressions aimed at estimating the effects of infrastructure and institutions on economic growth. All specifications consist of 5-year non-overlapping GDP per capita growth rate as a dependent variable and growth determinants as covariates. Results are obtained by employing the within (fixed effects) panel data estimator. All regressors, except Polity2 and time dummies, are used in natural logarithmic forms. Standard errors in parenthesis are heteroskedasticity robust. Significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively.

3.4.2 System-GMM estimation results

Next, Table 3.4 depicts results obtained by using the system-GMM dynamic panel data estimator, which addresses the problems of endogenous explanatory variables and time-invariant omitted variables. This estimator combines moment conditions for the model in first differences with moment conditions for the model in levels. The table depicts results for two infrastructure capital indicators: telephone (columns 1, 2 and 3) and electricity (columns 4, 5 and 6). For all specifications, institutional quality is proxied by Polity2. Our main variable of interest is the coefficient on the interaction term between infrastructure and institutions, which turns out to be positive and statistically significant in most of the specifications. The results confirm the presence of a positive and statistically significant correlation between infrastructure development and economic growth in the presence of democratic political regimes. The main difference between the fixed-effects results in Table 3.3 and the system-GMM results in Table 3.4 is that the effect of average years of tertiary education is not statistically significant in the system-GMM estimation while it was significant in one of the specifications in Table 3.3, generally depicting a weak relationship between education and economic growth. Likewise, Acemoglu et al. (2005) found that education measured by average years of schooling has no explanatory power for institutions when country fixed effects are included in the analysis.

In all of our specifications in Table 3.4, we use the two-step GMM

procedure and employ the so-called Windmeijer finite sample corrections on the standard errors (Windmeijer, 2005). As we are able to reject autocorrelation of order two, but not one, we use the second and third lags of the variables in levels as instruments for the equation in first differences. Hence, nowhere among the regressions did the overidentification and AR2 test statistics show any evidence of poor instrument choice or bad specification of the model at the 95% confidence level.

In summary, estimation results imply that both infrastructure capital and institutional quality are important for economic growth even after taking into account possible omitted variables and endogeneity problems using GMM-based panel data estimators. Moreover, while it is a common practice to consider the impacts of the two factors on economic growth separately (e.g., Acemoglu et al., 2005; Flachaire et al., 2014; Calderón et al., 2015), our use of interaction terms yields interesting results which confirm that the infrastructure and institutions are complementary to each other in their effects on economic growth.

Table 3.4: System-GMM estimation results

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Log of GDP per capita_t-1	-0.138***	-0.146***	-0.152***	-0.016	-0.014	-0.106***
	(0.033)	(0.032)	(0.026)	(0.023)	(0.029)	(0.023)
Log of telephone	0.705***	0.780***	0.542***			
	(0.210)	(0.212)	(0.160)			
Polity2	-0.026	-0.023	-0.025	0.003	-0.075	-0.173***
	(0.034)	(0.031)	(0.025)	(0.076)	(0.059)	(0.063)
Polity2 x telephone	0.049***	0.054***	0.053***			
	(0.014)	(0.014)	(0.013)			
Polity2 X electricity				0.011	0.021**	0.033***
				(0.011)	(0.009)	(0.010)
Log of electricity				0.093	0.126*	0.185**
				(0.077)	(0.075)	(0.074)
Log of average years						
of secondary education	0.571			-0.094		
	(0.503)			(0.373)		
Log of average years						
of tertiary education		0.925	-0.228		-1.391	-0.508
		(0.716)	(0.698)		(1.055)	(0.725)
Log of trade openness			0.363***			0.377***
			(0.133)			(0.118)
Log of financial development			0.753***			0.799***
			(0.176)			(0.212)

Continuation of Table 3.4

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Log of population						
growth rate			0.741***			0.586**
			(0.245)			(0.270)
Constant	9.574***	10.420***	0.158	0.806	0.621	-4.195**
	(2.105)	(2.309)	(2.615)	(1.274)	(1.641)	(1.836)
Observations	693	693	679	679	679	665
Number of countries	99	99	97	97	97	95
period dummy	Yes	Yes	Yes	Yes	Yes	Yes
Hansen Test (stat.)	0.131	0.135	0.740	0.169	0.183	0.845
Test AR3 (z-stat.)	0.461	0.464	0.759	0.409	0.333	0.642

Note: Results are obtained by employing the system-GMM estimator for dynamic panel data models. Standard errors in parenthesis are the Windmeijer robust standard errors. Significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. For further notes, see Table 3.3.

3.4.3 Robustness checks

This section shows that our results are robust to the use of a variety of alternative institutional quality measures and distinct indicators of infrastructure capital.

i. Alternative institutional quality indicators

Acknowledging the potential limitations of relying on Polity2 as the only measure of the quality of political institutions, we consider two groups of alternative institutional quality indicators. The first group consists of three indicators that are taken from the Polity IV Project dataset while the second group includes four indicators from the Country Risk Guide (ICRG) dataset. Following Docquier et al. (2016), we can classify these two datasets into de jure and de facto measures of institutional quality. Accordingly, the "Polity2", "democracy", "autocracy" and "executive constraints" are constructed based on expert coding of legal documents and can therefore be interpreted more as de jure measures. On the other hand, the "bureaucratic quality", "rule of law", "control of corruption", and "government stability" indices are based largely on subjective analysis and can therefore be seen as de facto measures of institutional quality.

Table 3.5: System-GMM estimation results with more de jure institutional quality indicators

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Executives	Democracy	Autocracy	Executives	Democracy	Autocracy
Log of GDP per capita_t-1	-0.148***	-0.159***	-0.132***	-0.111***	-0.130***	-0.099***
	(0.027)	(0.030)	(0.023)	(0.024)	(0.024)	(0.023)
Log of telephone	-0.001	0.352*	0.730***			
	(0.216)	(0.198)	(0.161)			
Executives con.	0.004			-0.454**		
	(0.078)			(0.201)		
Executives con. X telephone	0.149***					
	(0.036)					
Democracy		-0.035			-0.364***	
		(0.043)			(0.110)	
Democracy X telephone		0.093***				
		(0.020)				
Autocracy			0.049			0.246*
			(0.048)			(0.139)
Autocracy X telephone			-0.099***			
			(0.026)			
Log of electricity				-0.251*	0.036	0.283**
				(0.138)	(0.079)	(0.131)
Executives con. X electricity				0.096***		
				(0.031)		
Democracy X electricity					0.067***	
					(0.017)	

Continuation of Table 3.5

	Telephone			Electricity		
Column	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Executives	Democracy	Autocracy	Executives	Democracy	Autocracy
Autocracy X electricity						-0.045**
						(0.019)
Log of average years						
of tertiary education	-0.391	-0.556	-0.017	-0.486	-0.423	-0.230
	(0.718)	(0.766)	(0.625)	(0.746)	(0.738)	(0.745)
Log of trade openness	0.357***	0.344***	0.370***	0.446***	0.445***	0.355***
	(0.121)	(0.126)	(0.135)	(0.148)	(0.143)	(0.107)
Log of financial development	0.726***	0.703***	0.747***	0.734***	0.754***	0.856***
	(0.194)	(0.189)	(0.182)	(0.192)	(0.211)	(0.171)
Log of population						
growth rate	0.765***	0.844***	0.519***	0.534**	0.632**	0.280
	(0.259)	(0.258)	(0.195)	(0.257)	(0.268)	(0.197)
Constant	0.094	1.298	-1.004	-2.947	-3.199*	-4.320**
	(2.545)	(2.548)	(2.538)	(2.057)	(1.887)	(1.792)
Observations	679	679	679	665	665	665
Period dummy	Yes	Yes	Yes	Yes	Yes	Yes
Hansen Test (stat.)	0.795	0.828	0.781	0.887	0.931	0.918
Test AR3 (z-stat.)	0.738	0.784	0.659	0.643	0.702	0.491

Note: Results are obtained by employing the system-GMM estimator for dynamic panel data models. Standard errors in parenthesis are the Windmeijer robust standard errors. Significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. For further notes, see Table 3.3.

Table 3.5 documents system-GMM based results using three (de jure) measures of the quality of political institutions, which are taken from the Polity IV Project dataset. These alternative measures of political institutions are executive constraints (the degree of institutionalized constraints on the decision making powers of chief executives), institutional democracy and institutional autocracy. In columns 1 and 4 of Table 3.5, we report results on the interaction between executive constraints and telephone and electricity, respectively. The results indicate that infrastructure capital investment is positively and highly correlated with economic growth, and the correlation becomes stronger in the presence of executive accountability and political stability. As already discussed, the Polity2 score as a parameter is constructed by subtracting the institutionalized autocracy score of a country from its institutionalized democracy score to generate an aggregate measure of democracy that runs from -10 to 10.[5] In order to see the robustness of the results obtained using Polity2, we now decompose Polity2 into democracy and autocracy. In columns 2 and 5 of Table 3.5 we consider the interaction between telephone and institutionalized democracy, and electricity and institutionalized democracy, respectively. The results confirm that infrastructure capital investment has a positive and robust effect on economic growth and the effect increases as the democracy score improves. On the other hand, as results on columns 3 and 6 of Table 3.5 show, infrastructure capital positively affects eco-

[5]The Polity2 variable seemingly provides the political regime in events of "interregnum" and "transition".

nomic growth, but the effect gets weaker as governments become more autocratic. Therefore the results using disaggregated de jure institutional quality measures (Table 3.5) are qualitatively similar to the baseline results obtained by using the comprehensive Polity2 measure (Table 3.4).

We next turn to other alternative (de facto) measures of institutional quality given in the International Country Risk Guide (ICRG) dataset. Table 3.6 reports results for a similar set of estimations as in Table 3.4, but with bureaucratic quality, the rule of law, government stability and control of corruption as institutional quality indicators. In most of the specifications of Table 3.6, the results on the interaction between infrastructure capital and institutional quality are statistically significant with the expected signs. The four measures of political institutions all exhibit the same pattern, with good political institutions enhancing the effect of infrastructure capital on economic growth.

To sum up, our robustness analysis by means of alternative and disaggregated measures of political institutions indicates that political institutions play a crucial role in determining the effect of infrastructure capital on aggregate output.

Table 3.6: System-GMM estimation results with more de facto institution quality indicators

	Telephone				Electricity			
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Bureau.Q	Rule of law	Gove.S	Corru.	Bureau.Q	Rule of law	Gove.S	Corrup.
Log of GDP per capita_t-1	-0.178***	-0.167***	-0.138***	-0.175***	-0.150***	-0.152***	-0.163***	-0.166***
	(0.033)	(0.032)	(0.023)	(0.030)	(0.028)	(0.035)	(0.032)	(0.029)
Log of telephone	0.385**	0.293	0.071	0.123				
	(0.188)	(0.200)	(0.220)	(0.242)				
Bureaucratic Quality	-0.390**				-1.067*			
	(0.175)				(0.581)			
Bureaucratic Q. X telephone	0.247***							
	(0.083)							
Rule of Law		-0.091				-0.882*		
		(0.137)				(0.462)		
Rule of Law X telephone		0.155***						
		(0.054)						
Government stability			-0.066				-0.038	
			(0.081)				(0.174)	
Government S. X telephone			0.044*					
			(0.024)					
Control of Corruption				-0.231				-0.903
				(0.235)				(0.586)
Corruption X telephone				0.198***				
				(0.074)				

Continuation of Table 3.6

	Telephone				Electricity			
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Bureau.Q	Rule of law	Gove.S	Corru.	Bureau.Q	Rule of law	Gove.S	Corrup.
Log of electricity					0.206	-0.028	0.432	0.140
					(0.296)	(0.264)	(0.275)	(0.332)
Bureaucratic Q. X electricity					0.127			
					(0.087)			
Rule of Law X electricity						0.146**		
						(0.060)		
Government S. X electricity							0.010	
							(0.023)	
Corruption X electricity								0.140**
								(0.068)
Log of average years of tertiary education	0.692	1.190	1.020	0.688	1.099	0.382	1.287*	0.520
	(0.715)	(1.029)	(0.708)	(0.853)	(0.830)	(1.033)	(0.719)	(0.916)
Log of trade openness	0.268***	0.264**	0.362***	0.347***	0.386***	0.314***	0.371***	0.467***
	(0.096)	(0.102)	(0.116)	(0.121)	(0.119)	(0.091)	(0.110)	(0.164)
Log of financial development	0.765***	0.599***	0.771***	0.873***	0.818***	0.827***	0.811***	0.797**
	(0.199)	(0.214)	(0.213)	(0.224)	(0.252)	(0.228)	(0.221)	(0.339)
Log of population growth rate	0.463*	0.579**	0.063	0.548*	0.046	0.227	-0.118	0.357
	(0.256)	(0.231)	(0.202)	(0.282)	(0.291)	(0.215)	(0.216)	(0.304)
Constant	4.674*	3.883	0.536	2.530	-0.283	2.336	-0.787	-1.167
	(2.710)	(2.552)	(2.288)	(2.616)	(2.572)	(2.367)	(2.312)	(3.043)

Continuation of Table 3.6

	Telephone				Electricity			
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Bureau.Q	Rule of law	Gove.S	Corru.	Bureau.Q	Rule of law	Gove.S	Corrup.
Observations	637	637	637	637	630	630	630	630
Number of Id	91	91	91	91	90	90	90	90
Period	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hansen Test (stat.)	0.918	0.880	0.962	0.892	0.933	0.892	0.987	0.946
Test AR3 (z-stat.)	0.604	0.621	0.369	0.234	0.956	0.996	0.666	0.420

Note: Results are obtained by employing the two-step system-GMM estimator for dynamic panel data models. Standard errors in parenthesis are the Windmeijer robust standard errors. Significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. For further notes, see Table 3.3.

ii. Telephone subscription including cellular phones

Our next robustness check involves employing an alternative measure of the telephone infrastructure. Following the emergence of the information and communication technology (ICT), cellular phones have become more popular since the 1990s.

In the baseline analysis, we used the fixed line telephone subscriptions as a proxy for infrastructure capital. Table 3.7 estimates the effect of institutions and infrastructure on economic growth by using the total number of telephone subscriptions per capita (both fixed line and cellular) as a proxy for infrastructure capital. The data for the total number of telephone subscriptions per capita are drawn from the Cross-National Time-Series Data Archive (CNTS) dataset. Results documented in Table 3.7 show that, except for columns 3 and 8, the interaction terms between infrastructure and institutions have statistically significant effects with the expected signs. Therefore, these results confirm the robustness of our baseline results to using a more comprehensive telephone infrastructure indicator.

Table 3.7: System-GMM Analysis with All Telephone Per Capita

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Polity 2	Executive	Democracy	Autocracy	Rule of Law	Bureau. Q	C.Corru.	Gover.S
Log of GDP per capita_t-1	-0.109***	-0.131***	-0.121***	-0.101***	-0.123***	-0.138***	-0.149***	-0.126***
	(0.020)	(0.023)	(0.022)	(0.018)	(0.022)	(0.028)	(0.029)	(0.028)
Polity2 X all telephone	0.015**							
	(0.007)							
Polity2	-0.138*							
	(0.079)							
Log of all telephone per capita	0.260**	0.067	0.204*	0.313***	0.113	0.200	0.085	0.214
	(0.105)	(0.116)	(0.112)	(0.116)	(0.146)	(0.141)	(0.191)	(0.173)
Executive X all telephone		0.057**						
		(0.022)						
Executive		-0.509**						
		(0.254)						
Democracy X all telephone			0.024					
			(0.015)					
Democracy			-0.203					
			(0.172)					
Autocracy X all telephone				-0.027*				
				(0.015)				
Autocracy				0.242				
				(0.156)				

Continuation of Table 3.7

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Polity 2	Executive	Democracy	Autocracy	Rule of Law	Bureau.Q	Corru.	Gove.S.
Rule of law all telephone					0.067			
					(0.046)			
Rule of Law					-0.598			
					(0.490)			
Bureaucratic Q. X all telephone						0.138**		
						(0.066)		
Bureaucratic Quality						-1.477**		
						(0.663)		
C.Corruption X all telephone							0.099*	
							(0.059)	
Control of corruption							-0.927	
							(0.642)	
Government Stability X all telephone								0.025
								(0.026)
Government Stability								-0.421
								(0.296)
Log of average years								
of tertiary education	-0.033	0.170	0.075	-0.026	0.448	0.290	0.402	0.524
	(0.516)	(0.576)	(0.598)	(0.465)	(0.574)	(0.656)	(0.685)	(0.768)
Log of trade openness	0.347***	0.396***	0.365**	0.313***	0.317***	0.351**	0.402***	0.299***
	(0.130)	(0.151)	(0.161)	(0.106)	(0.116)	(0.137)	(0.125)	(0.094)
Log of financial development	0.922***	0.935***	0.929***	0.957***	0.893***	1.038***	1.102***	1.081***
	(0.213)	(0.190)	(0.214)	(0.176)	(0.199)	(0.229)	(0.228)	(0.218)

Continuation of Table 3.7

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Polity 2	Executive	Democracy	Autocracy	Rule of Law	Bureau.Q	Corru.	Gove.S.
Log of population growth rate	0.168	0.064	0.127	0.158	0.153	0.116	0.212	0.032
	(0.169)	(0.203)	(0.195)	(0.160)	(0.199)	(0.209)	(0.225)	(0.223)
Constant	-4.184**	-1.751	-3.508	-4.760**	-1.416	-2.031	-1.195	-0.786
	(1.917)	(2.066)	(2.512)	(1.934)	(2.404)	(2.378)	(2.729)	(2.828)
Observations	679	679	679	679	637	637	637	637
Number of Id	97	97	97	97	91	91	91	91
Period	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hansen Test (stat.)	0.985	0.991	0.987	0.990	0.994	0.995	0.899	0.965
Test AR3 (z-stat.)	0.417	0.374	0.473	0.448	0.998	0.961	0.423	0.806

Note: Results are obtained by employing the two-step system-GMM estimator for dynamic panel data models. Standard errors in parenthesis are the Windmeijer robust standard errors. Significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. For further notes, see Table 3.3.

3.5 Conclusion

The current study revisits the ongoing debate on the determinants of long-run economic growth with a specific focus on the roles of infrastructure capital and political institutions. Our hypothesis is that marginal effect of the infrastructure capital on economic growth depends on the quality of existing political institutions, i.e., the better the institutional quality, the larger the productivity of infrastructure. In order to address potential econometric concerns with respect to endogeneity and reverse causality, we verify our hypothesis not only by means of the fixed-effects estimations, but also by using system-GMM dynamic panel data estimations.

Our results show that there is a positive correlation between infrastructure capital and economic growth in countries with good institutional quality. On the other hand, the results indicate that the productivity of infrastructure capital is not positively associated with economic growth in countries where a highly autocratic regime is in power. These results are robust to the use of different specifications and estimators, and they are consistent with a variety of alternative indicators of infrastructure (electric power generation and telecommunication subscriptions) and political institutions (democracy, autocracy, executive constraint, bureaucratic quality, the rule of law, and government stability).

Our results confirm that the effect of infrastructure capital on aggregate output depends on the quality of political institutions prevail-

ing in a country. These results are in line with two potential explanations. First, political institutions, even in the absence of a significant direct effect (Flachaire et al., 2014), are a central element in the growth process since they determine the marginal effect on economic growth of standard growth determinants such as investment in infrastructure capital. More precisely, countries with democratic institutional frameworks (binding legislature) have a higher level of economic growth, whereas authoritarian regimes (nonbinding legislatures) adversely affect economic growth (Wright, 2008). Second, regulations are important mechanisms to increase the productivity of public investments as inefficiency is pervasive in public-owned investments. Dal Bó and Rossi (2007) and Corrado and Rossetti (2018) show that a higher level of corruption is strongly associated with a lower degree of efficiency in using infrastructure capital. Moreover, when countries have a weaker commitment to power and regulatory capacity, potential returns from infrastructure might be lower due to weak contract enforcement, expropriation, and opportunistic renegotiations (Straub, 2011).

Finally, note that the current study has the following limitations, which will need to be addressed by future research. First, both the theoretical model and the empirical estimation do not address the issue of infrastructure quality. Second, the study does not distinguish between private and public ownership of the infrastructure capital. Third, due to a lack of a sufficiently large panel data for other infrastructure sectors, such as transportation, we only use the telephone subscriptions and electric power generation as proxies for infrastructure capital.

3.6 Appendix

3.6.1 Theoretical Framework

Our theoretical model builds up on the endogenous growth model of Barro (1990), which incorporates infrastructure capital as one factor of production. Additionally, following Canning and Pedroni (2008), we specify a Cobb-Douglas type production function and apply the model to panel data as

$$Y_{it} = A_{it}.K_{it}^{\alpha}.G_{it}^{\beta}.L_{it}^{1-\alpha-\beta} \tag{3.6}$$

where the countries and time periods are indexed by i and t, respectively. Aggregate output Y is produced by employing (non-infrastructure) aggregate capital stock K, infrastructure capital stock G, aggregate hours worked by the labor force L, and total factor of productivity A. For simplicity, it is assumed that infrastructure capital is a fixed fraction τ_{it} of total savings s. It can be shown that there is a growth and welfare-maximizing level of investment in the infrastructure capital τ^* (Canning and Pedroni, 2008; Straub, 2011). Note that, without shocks in infrastructure capital, given by $\tau^* = \beta \mid \alpha + \beta$ (Barro, 1990).

Furthermore, Canning and Pedroni (2008) show that the proportion of investment going to infrastructure is $\tau_{it} = \bar{\tau} + \mu_{it}$ where μ_{it} is a zero mean stationary series. Accordingly, in the endogenous growth model, a positive shock to the infrastructure capital will increase income per capita when $\bar{\tau} < \tau^*$ and income per capita will decrease when $\bar{\tau} >$

τ^*.[6] The marginal cost of the increased infrastructure capital is the diversion of resources from other productive sectors, while the marginal benefit is the gain in the long-run income (Straub, 2011).

However, Aron (2000) argues that in growth models, the presence of threshold levels of certain inputs such as infrastructure must be in place before production is feasible. Hence, the constant returns to scale assumption may not be satisfied. Thus, the effect of infrastructure capital on output can be dependent on country-specific institutional variables.

To capture this notion, we redefine the production function specified in the above equation by including rent-seeking activities that act as a distortion in the production process. Our new production function model is adapted from Nawaz et al. (2014), and given as

$$Y_{it} = (1 - \eta_{it}) A_{it}.K_{it}^{\alpha}.G_{it}^{\beta}.L_{it}^{1-\alpha-\beta} \tag{3.7}$$

where $\eta_{it} \in [0, \hat{\eta}], \hat{\eta} \ll 1$ denotes rent-seeking behavior.

In our model, institutional quality is captured by rent-seeking as a proxy. Formally, $\hat{\eta}$ is the point at which rent-seeking is the highest (institutional quality is the lowest).

We assume that each firm uses all its capacity to appropriate as much rent as possible, which is dependent on the total amount of rent

[6] Canning and Pedroni (2008) complement the model by describing the evolution of the technical progress, A_{it}, the share of investment going to infrastructure, τ, and the size of the workforce, L_{it}.

and the quality of institutions. When $r_{it} = 0$, it indicates the presence of high institutional quality, whereby an agent extracts less rent. On the contrary, when $r_{it} = 1$, institutional quality hits its lowest level, and hence, the marginal utility of rent-seeking reaches its maximum (Nawaz et al., 2014). Thus, the level of r_{it} determines the marginal productivity of infrastructural investment.

In contrast, good institutional quality improves the efficiency of infrastructure capital as resources are prevented from being wasted in rent-seeking activities, so they lead to higher economic growth. Furthermore, to predict the long-run growth patterns, it is important to test the consumption and investment decisions made by individual agents. In doing so, we assume that a representative agent is facing an infinite planning horizon and maximizing utility subject to a dynamic budget constraint. As a result, the agent seeks to maximize inter-temporal utility, which is defined as

$$U_{it} = \int_0^\infty e^{-\rho t} \frac{C_{it}^{1-\sigma} - 1}{1 - \sigma} dt, \tag{3.8}$$

where C_{it} denotes consumption per capita, and we assume that $0 < \sigma < 1$. This implies that the elasticity of marginal utility equals the constant $-\sigma$. Moreover, $e^{-\rho t}$ represents the time preference rate, where $\rho > 0$ is a time discount factor. By assuming that other elements of the production function are constant in (3.7) for simplification, the dynamic budget constraint of infrastructure in per capita terms is subject to:

$$\dot{G_{it}} = \frac{dG}{dt} = (1 - \eta_{it}) A_{it}.K_{it}^{\alpha}.G_{it}^{\beta}.L_{it}^{1-\alpha-\beta} - C_{it} \tag{3.9}$$

where a dot over a variable denotes a time derivative. It is assumed that the infrastructure capital stock is $G_{(0)} = 1$ at the initial period. The terminal condition is given as $lim_{t\to\infty} G\lambda e^{-\rho t} = 0$, which indicates that the infrastructure capital stock left over at the end of the planning horizon is zero. In (3.9) we can observe that increases in the infrastructure capital stock (where $\tau < \tau*$) are equal to the total saving, which in turn, is equal to the difference between output and consumption. Hence, in this case the individual agent chooses depending on whether the specificity you wish to indicate optimal consumption $[C_{it} : t \geqslant 0]$ and investment path to determine the level of infrastructure capital stock $[G_{it} : t \geqslant 1]$. To find this optimal allocation of resources by the individual agent, Nawaz et al. (2014) suggest to apply Hamiltonian function, which is given by

$$H = e^{-\rho t} \frac{C_{it}^{1-\sigma} - 1}{1 - \sigma} + \lambda[(1 - \eta_{it}) A_{it}.K_{it}^{\alpha}.G_{it}^{\beta}.L_{it}^{1-\alpha-\beta} - C_{it}] \tag{3.10}$$

In (3.10), the expression within the square brackets is equal to $\dot{G}$ and λ is the Lagrange multiplier representing the present value of the shadow price of income. Differentiation of the Lagrange function with respect to C_{it} and G_{it} yields the first order conditions

$$\frac{\partial H}{\partial C_{it}} = 0 \Rightarrow e^{-\rho t} \frac{C_{it}^{-\sigma}}{1 - \sigma} - \lambda = 0 \tag{3.11}$$

and

$$\frac{\partial H}{\partial G_{it}} = -\dot{\lambda} \Rightarrow \lambda(1-\rho_{it})A_{it}.K_{it}^{\alpha}.\beta G_{it}^{\beta-1}.L_{it}^{1-\alpha-\beta} = -\dot{\lambda}. \tag{3.12}$$

From (3.11) and (3.12) and fixing the infrastructure capital stock $G(0) = 0$, the transversality condition equals $lim_{t\to\infty} G_{it}\lambda e^{-\rho t} = 0$. Using the budget constraint in (3.9), the growth rate of per capita consumption, which is the same as the growth rate of output and infrastructure capital, is given as follows:

$$\frac{\dot{y}_{it}}{yit} = \frac{\dot{C}_{it}}{C_{it}} = \frac{1}{\sigma}[(1-\eta_{it})A_{it}.K_{it}^{\alpha}.\beta G_{it}^{\beta-1}.L_{it}^{1-\alpha-\beta} - \rho] \tag{3.13}$$

and

$$\frac{\dot{y}_{it}}{yit} = \frac{\dot{C}_{it}}{C_{it}} = \frac{(1-\eta_{it})}{\sigma}(A_{it}.K_{it}^{\alpha}.\beta G_{it}^{\beta-1}.L_{it}^{1-\alpha-\beta})\frac{-\rho}{\sigma}. \tag{3.14}$$

The outcome in (3.13) indicates that as institutional quality improves, rent-seeking activities decrease. In our context, this implies that high institutional quality enhances the productivity of infrastructure capital. Finally, differentiating (3.14) with respect to rent-seeking activities obtains

$$\eta_{it} = \frac{\frac{\partial \dot{y}_{it}}{y_{it}}}{\partial \eta_{it}} = \frac{-(A_{it}.K_{it}^{\alpha}.\beta G_{it}^{\beta-1}.L_{it}^{1-\alpha-\beta})}{\sigma^2} > 0, \tag{3.15}$$

showing that, as η_{it} increases, economic growth decreases if $\sigma > 0$.

After a logarithmic transformation, the model (3.14) is written as

$$\dot{y_{it}} = \alpha + \theta G_{it} + \gamma I_{it} + \sigma I_{it} * G_{it}, \tag{3.16}$$

where $\dot{y_{it}}$ denotes the GDP per capita growth rate for country i at time period t, I_{it} represents an indicator of institutional quality, G_{it} stands for infrastructure capital, and $I_{it} * G_{it}$ is the interaction term between institutions and infrastructure.

Finally, it is noteworthy that the theoretical model discussed above indicates that the higher η_{it}, the lower economic growth will be due to less productivity of infrastructure capital and vice versa. The validation of the statement therefore specifies that when $\eta_{it} = 0$ (in the case of strong institutions) economic growth is with $\frac{1}{\sigma}[A_{it}.K_{it}^{\alpha}.\beta G_{it}^{\beta-1}.L_{it}^{1-\alpha-\beta} - \rho]$ higher than the economic growth under weak institutions $0 < \eta_{it} < \hat{\eta}$, which is given by,

$$\frac{1}{\sigma}[(1-\eta_{it})A_{it}.K_{it}^{\alpha}.\beta G_{it}^{\beta-1} L_{it}^{1-\alpha-\beta} - \rho].$$

3.6.2 Marginal Effect Figures

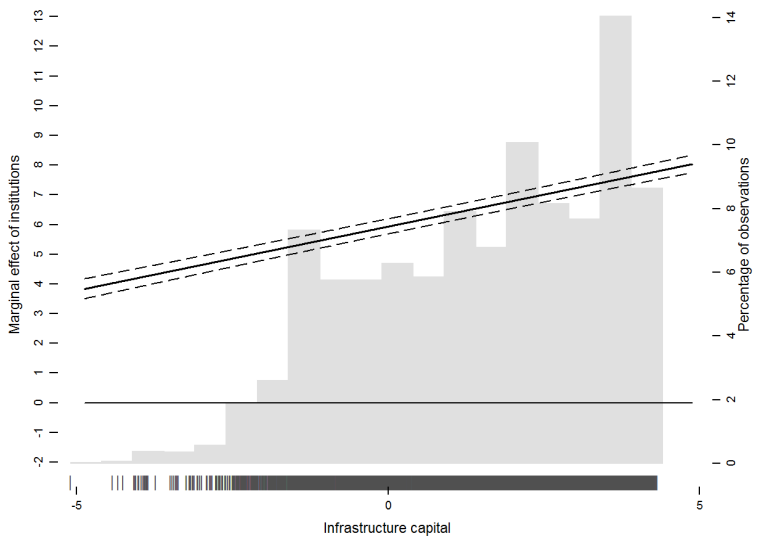

Figure 3.3: The effect of telephone infrastructure on the marginal effects of Polity2 on economic growth. The graph is derived from the OLS regression results documented in in column 3 of Table 3.2.

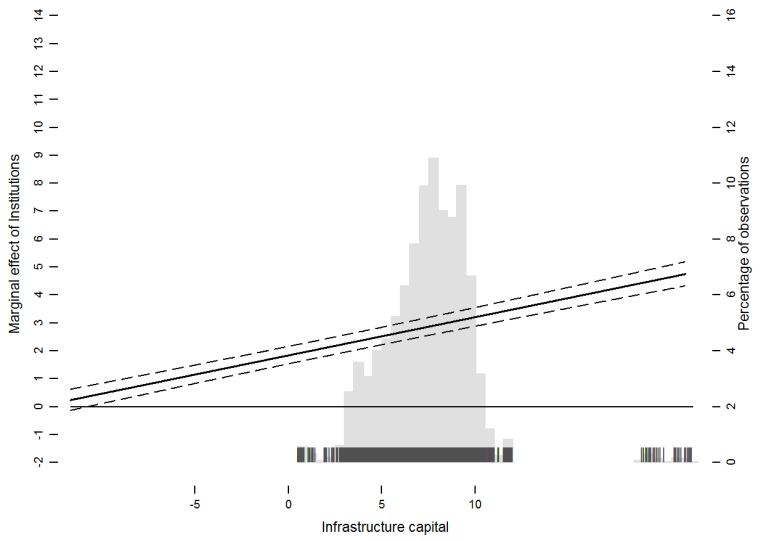

Figure 3.4: The effect of electric power infrastructure on the marginal effects of Polity2 on economic growth. The graph is derived from the OLS regression results documented in column 6 of Table 3.2.

3.6.3 List of the countries

Table 3.8: List of countries

Code	Country	Code	Country	Code	Country	Code	Country
1	Albania	31	Cyprus	61	Jordan	91	Philippines
2	Algeria	32	Denmark	62	Kenya	92	Portugal
3	Angola	33	Dominica	63	Korea, Rep.	93	Rwanda
4	Argentina	34	Dominican Republic	64	Lesotho	94	Samoa
5	Australia	35	Ecuador	65	Luxembourg	95	Saudi Arabia
6	Austria	36	Egypt, Arab Rep.	66	Madagascar	96	Senegal
7	Bangladesh	37	El Salvador	67	Malawi	67	Seychelles
8	Barbados	38	Ethiopia	68	Malaysia	98	Sierra Leone
9	Belgium	39	Fiji	69	Mali	99	Singapore
10	Belize	40	Finland	70	Malta	100	South Africa
11	Benin	41	France	71	Mauritania	101	Spain
12	Bolivia	42	Gabon	72	Mauritius	102	St. Lucia
13	Botswana	43	Gambia, The	73	Mexico	103	Sudan
14	Brazil	44	Germany	74	Mongolia	104	Suriname
15	Bulgaria	45	Ghana	75	Morocco	105	Swaziland
16	Burkina Faso	46	Greece	76	Mozambique	106	Sweden
17	Burundi	47	Grenada	77	Namibia	107	Switzerland
18	Cabo Verde	48	Guatemala	78	Nepal	108	Tanzania
19	Cameroon	49	Guinea-Bissau	79	Netherlands	109	Thailand
20	Canada	50	Guyana	80	New Zealand	100	Togo
21	Central African Republic	51	Honduras	81	Nicaragua	111	Tunisia
22	Chad	52	Iceland	82	Niger	112	Turkey
23	Chile	53	India	83	Nigeria	113	Uganda
24	China	54	Indonesia	84	Norway	104	United Kingdom
25	Colombia	55	Iran, Islamic Rep.	85	Oman	115	United States
26	Comoros	56	Ireland	86	Pakistan	116	Uruguay
27	Congo, Dem. Rep.	57	Israel	87	Panama	117	Vanuatu
28	Congo, Rep.	58	Italy	88	Papua New Guinea	118	Venezuela, RB
29	Costa Rica	59	Jamaica	89	Paraguay	119	Zambia
30	Cote d'Ivoire	60	Japan	90	Peru	120	Zimbabwe

Chapter 4

The Effect of Emigration on Political Stability and Institutional Quality: Evidence from African Countries

Overview. Migration contributes to the flow of goods, skills, knowledge, information, ideas and financial capital. A rapidly growing body of research examines the effect of migration on the social and economic spheres of destination states and countries of origin. In this chapter we study how migrants affect the political stability and institutional reforms of their home countries. Several possible factors could explain/define the nature and direction of emigrant involvement

determining the political stability and institutional qualities of their homelands. In this context, we consider information transfer and cultural diffusion channels. To this end, we use cross–sectional and panel estimation techniques for a large sample of African countries as origin and OECD countries as destination countries.

Keywords: migration; political stability; institutional quality

4.1 Introduction

It is important to note that this chapter aims to present ideas that are part of the work-in-progress for this Ph.D thesis. Recent studies have provided evidence on the impact of political conditions on international migration (e.g., Clemens, 2017; Docquier et al., 2018; Shrestha, 2017). Our findings in Chapter 2 also confirm that additional to economic factors, political instability and weak institutional quality significantly affect trends of international migration flow. It is noteworthy that Africa, as one of the most civil–war–prone regions in the world, has experienced mass migration within the continent and across the ocean (Naudé, 2010; Lucas, 2014). Political tensions such as intrastate conflicts and terrorism, as well as human and political rights violations and persecution on the grounds of nationality, ethnicity, religion, political opinion or social group have forced African people to move abroad in search of basic safety and security (Adepoju, 1995, 2008).

On the other hand, emigrants also play a pivotal role in the development process of their home countries. However, less attention has

been paid to how the political experiences of migrants spill over to their home communities and affect the political behavior of those who stay behind. The current study emphasizes the role of emigration in determining political stability and institutional qualities in their home countries, building on cross–country comparisons for a large set of African countries over the last twenty-five years. Therefore, in this chapter we look at the return impact of migrants on their home countries focusing on political involvement relating to peacemaking and improving the quality of institutions. Developing this idea further, we aim to investigate whether the negative relationship between emigration and civil conflict and the positive relationship between emigration and institutional reforms hold once we control for some essential variables that determine conflicts and institutional quality.

In most cases, it is assumed that when people remain in exile for a reasonable amount of time, they are exposed to new knowledge, experience, skills, ideas, information and institutions. In this regard, international migration increases the probability that individuals change their attitudes, beliefs, perceptions, and political preferences. Hence, living abroad as an immigrant is associated with a transformative experience (Barsbai et al., 2017). Indeed, the economic and political atmosphere of the destination countries matters significantly for the ability of migrants to participate in the development and institutional building process of their countries of origin. However, economic development participation or positive political engagement of the migrants in their country of origin mainly depends on their competencies (Bau-

dassé et al., 2018). Further, Chukwu-Emeka (2011) argues that the involvement of migrants in development activities or in improving the political trends of their home countries is shaped by their financial, intellectual, political, cultural or social capital. In this regard, although the biggest number of emigrants reside within Africa, significant number of Africans still immigrate to extra-continental destinations.[1] We assume that due to the relative political stability and effective institutions of the developed countries, migrants absorb new political ideas, norms, information and practices, which they then transfer to their home communities.[2] Such political spillovers, in turn have the potential to transform political preferences, attitudes, and strategies by strengthening the constituency for political change or promoting a culture of peace, especially in regions like Africa, where information acquisition is difficult and costly (Barsbai et al., 2017).

There are several reasons why migrants may influence the political tradition of their home countries. The literature discuss rationales beyond purely ideological and philanthropic considerations to explain, why migrants become involved in conflict prevention and enhance the quality of institutions in their country of origin. In this regard, Baudassé et al. (2018) lists a few arguments. First, migrants who intend to return home for diverse reasons are mainly concerned with their

[1]Recent reports, for instance, United Nations Department of Economic and Social Affairs (2017) show who African emigrants who stayed within Africa and those that moved outside the continent in 2017 were 53 percent and 47 percent, respectively.

[2]In this case, we consider African immigrants that inhabit in the Organization for Economic Cooperation and Development (OECD) countries.

security and safety as well as with the quality of institutions. Particularly, entrepreneur and investor members of Diaspora who are very keen to return home, need enabling environments, like political stability and effective institutions, that safeguard their business and protect them from any abuses. Second, the engagement of migrants in conflict prevention and peacemaking, as well as their efforts towards institutional improvement, are derived from concerns about their families and friends being able to sustain themselves (Smith and Stares, 2007). In relation to the second reason Baudassé et al. (2018) further argues that due to the highly restrictive entry policies of developed countries, migrants seek peace and effective institutions in their home countries as they face difficulties in bringing their families. Finally, migrants could be motivated to get involved in their countries' political transformation based on their exposure to political stability and good institutional quality in destination countries.

The remainder of the chapter is organized as follows. Section 4.2 provides the empirical strategy and Section 4.3 presents open questions and future research.

4.2 Empirical Strategy

Employing a similar strategy to that used in Chapter 2, our analysis is based on the distinction between the "exit and voice" dichotomy of Hirschman (1970). In this chapter we particularly focus on the "voice" option. Contrary to the conclusion that migration might weaken the "voices" of emigrants proffered by Hirschman (1970), within the context of the contemporary globalized world, characterized by cheap and fast communication (including social media) and travel facilities, migration may no longer imply that emigrants lose their "voice" at home.

Our empirical objective is to investigate the effect of emigration on political stability and the quality of institutions in countries of origin. For political stability, $P_{i,t}$, we use two indicators of conflicts, i.e., civil conflict incidence and civil war. In the same manner, we also use several indicators of institutional quality, $I_{i,t}$, (including, democracy, political rights, civil liberty, control of corruption, rule of law, government stability, and bureaucratic quality), and measures of migration, $M_{i,t}$, available for country of origin $i = 1, ..., N$ and year $t = 1, ..., T$. In our benchmark, we estimate annual flows of migration from African country i to OECD destination country j at time t, $\sum_j M_{ij,t}$. Alternatively, we regress migration stock from country i in OECD destination country j at time t, $\sum_j S_{ij,t}$.

In constructing our empirical model we consider political stability, $P_{i,t}$, and the quality of institutions, $I_{i,t}$, as the dependent variables. We augment the linear dynamic specification by adding the migra-

tion flows or migration stocks to the set of explanatory variables. The model is used in different approaches in the political stability literature (e.g., Reynal-Querol and Montalvo, 2005; Esteban et al., 2012; Janus and Riera-Crichton, 2015; Giménez-Gómez and Zergawu, 2018) and previous studies on institutional quality (Acemoglu et al., 2005; Bobba and Coviello, 2007; Castelló-Climent, 2008; Spilimbergo, 2009; Docquier et al., 2016).

$$P_{i,t} = \alpha + \beta P_{i,t-1} + \gamma m_{i,t-1} + \sum_k \delta_k X^k_{i,t-1} + \epsilon_{i,t} \tag{4.1}$$

where α is a constant. The lagged dependent variable enters the set of explanatory variables with coefficient β to account for persistence in political stability (or in institutional quality, in the other case).[3] Our coefficient of interest, γ captures the short-run effect of the migration flows (or migration stock in the other case) on political stability (or institutional quality) at the home country. $X^k_{i,t-1}$ is a vector of K additional control variables ($k = 1, ...K$). The vector δ includes parameters associated with the set of controls and captures their short-run effects on political stability (or institutional quality). All explanatory variables are lagged by one period.[4] We use a set of controls X that covers the major determinants of political stability and institutional quality that are conventionally unidentified by the existing literature. These control variables include GDP per capita, human capital, trade

[3]Similarly, in order to estimate the effect of emigration on institutions we use institutional quality indicators as a dependent variable $I_{i,t} = \alpha + \beta I_{i,t-1} + \gamma m_{i,t-1} + \sum_k \delta_k X^k_{i,t-1} + \epsilon_{i,t}$.

[4]Note that in this case, one period represents five years.

openness, net official development assistance as a share of GNI, geographic characteristics, ethnic polarization, ethnic fractionalization, legal origin, and sub-regions.

In a multiple regression model, adding more explanatory variables is problematic because of multicollinearity. For instance, GDP per capita is undoubtedly highly correlated with human capital, and migration itself is correlated with trade. For this reason, and in order to show that our results are robust, we add one control (or set of controls) at a time.

In growth models, the dynamic specification (4.1) has been commonly used to show the dynamics of persistent variables, such as GDP per capita, and stock of human or physical capital. As Docquier et al. (2016) explain, the predictor variables are persistent (for instance, $m_{i,t} = m_{i,ss}$, and $X_{i,t} = X_{i,ss} \forall t$, where ss stands for steady state) and if the coefficient of the lagged dependant variable is between 0 and 1 (i.e., $\beta \in [0; 1]$), then the level of the dependent variable converges towards a steady state level, which is given by (4.2)

$$P_{i,t} = \frac{\alpha + \gamma m_{i,ss} + \delta X_{i,ss}}{1 - \beta} \tag{4.2}$$

which characterizes the long-run relationship between political stability (or institutions) and the right-hand side variables. In that case, $\frac{\gamma}{1-\beta}$, captures the long-run effect of emigration on the more desirable political environment, i.e., political stability and democracy.

4.3 Final remarks

Following the aforementioned empirical strategy, we employ various estimation techniques. While we estimate (4.1) using the panel dataset, in order to estimate (4.2) we use a cross–sectional setting with one observation per country. Indeed, we are conscious of econometric advantages and disadvantages in using the panel and cross–sectional settings. In this regard, note that Docquier et al. (2016) summarize the pros and cons of the panel and cross–sectional frameworks. In the case of panel dataset, we can characterize the transitional dynamics of political stability or institutional quality and better deal with unobserved heterogeneity. However, we need to find exogenous instruments that are both country–and time– specific. In a across–section framework, on the other hand, the underlying steady–state assumption, albeit questionable, enables the difficulties inherent to the endogeneity of the lagged dependent variable to be circumvented; however, in such a framework the omitted variable issue is likely to be severe.

We estimate (4.1) and (4.2) using various estimation techniques. In the first phase of our regression, we use OLS or pooled OLS techniques. However, we are aware of the fact that such regression techniques might generate serious econometric limitations. Particularly, using cross-sectional or pooled OLS regressions might incur the endogeneity of our main variable of interest, the emigration flow or stock. Therefore, in the second phase of our regressions, in order to overcome the endogeneity problems (that relate to reverse causality and unob-

served country characteristics) we use two strategies. First, we apply the two-stage least squares ($2SLS$) estimation strategy. Accordingly, we use appropriate instrumental variables (IV). Then, to check the robustness of the IV strategy, we use the system–GMM estimator with internal instruments. In the literature, system-GMM is commonly used to account for unobservable heterogeneity and persistence in the lagged dependent variables and other regressors (see, for instance, Bobba and Coviello, 2007; Castelló-Climent, 2008; Docquier et al., 2016).

Using the data from the sources that are indicated in the previous chapters, particularly in Chapter 2, we develop a dataset which is a five-year balanced panel covering the period between 1990 and 2015, where the initial year refers to the dependent variable (i.e., $t = 1990, t - 1 = 1985$). In this study, since we consider African countries, we focus on entirely developing countries, and these sample countries are included in the panel if they have a significant amount of data for each variables.

Our conjectures about the expected results are that emigration and civil conflict or civil war are negatively correlated, while emigration and institutional quality indicators are positively correlated. In doing so, we assess the effect of emigration on political stability and institutional quality using the OLS regression, relaying on both cross-sectional and panel regression methods. Certainly, there are many identification issues in using OLS and that needs to be addressed when looking at the effect of emigration on political stability or institutions. Notably, aspects of the direction bias between emigration and conflict or in-

stitutions due to the reverse causality problem, as well as the omitted variable bias leads to uncertainty in the findings. Hence, in order to address these econometric shortcomings, we use the IV strategy. When using the IV strategy, we follow two approaches. First, we use a gravity model predicting a country's migration flow or migration stock out of the set of reasonably exogenous dyadic variables by interacting with time dummies in the dynamic panel estimation. Second, we estimate the effect of emigration on political stability and institutions with internal instruments using system–GMM regression. These estimation techniques help us to overcome the econometric issues related to the downward bias OLS estimations. Indeed, from the IV strategies we also expect a negative correlation between emigration and conflict, as well as a positive relationship between emigration and institutions.

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